Report of
The Maryland Agricultural Society—
Maryland Farm Bureau Federation,

INCLUDING REPORTS OF THE

Maryland State Horticultural Society,
Maryland Crop Improvement Association,
Maryland State Dairymen's Association,
Maryland State Beekeepers' Association,
Maryland Vegetable Growers' Association,
Maryland Stockmen's Association,
Maryland Poultrymen's Association,
Maryland Tobacco Growers' Association,
Home and Community Committee Meeting,
4-H Club Conference.

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REPORT OF THE

MARYLAND AGRICULTURAL SOCIETY

THE

MARYLAND FARM BUREAU FEDERATION

INCLUDING THE REPORTS OF

THE MARYLAND STATE HORTICULTURAL SOCIETY
THE MARYLAND CROP IMPROVEMENT ASSOCIATION
THE MARYLAND STATE DAIRYMEN'S ASSOCIATION
THE MARYLAND STATE BEEKEEPERS' ASSOCIATION
THE MARYLAND VEGETABLE GROWERS' ASSOCIATION
THE MARYLAND STOCKMEN'S ASSOCIATION
THE MARYLAND POULTRYMEN'S ASSOCIATION
THE MARYLAND TOBACCO GROWERS' ASSOCIATION
HOME AND COMMUNITY COMMITTEE MEETING
4-H CLUB CONFERENCE

VOLUME XIV, FOR THE YEAR 1929

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BALTIMORE, MD.

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LETTER OF TRANSMITTAL

To His Excellency, Albert C. Ritchie,
Governor of Maryland.

SIR:

I herewith submit to you as directed by the Act incorporating the Maryland Agricultural Society, and also the Horticultural Society, this report for the year 1929, which contains a detailed statement of the receipts and expenditures of the Society as approved by the Executive Committee and Advisory Council. It contains the proceedings of the fourteenth annual meeting of the Maryland Agricultural Society, Maryland Farm Bureau Federation, and annual meetings of the Affiliated Associations.

I trust that an inspection of its contents will convince you that the funds appropriated for this purpose have been wisely and judiciously expended.

Respectfully submitted,

M. M. STEWART,
Secretary.

May 1, 1930,
Baltimore, Md.

THE MARYLAND AGRICULTURAL SOCIETY—
MARYLAND FARM BUREAU FEDERATION

Sherwood Building

Baltimore, Md.

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1930

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Maryland State Poultry Association

President, S. M. Horst.....Maugansville
Secretary, Aaron Fell.....Bethesda

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REPORT

of the

FOURTEENTH ANNUAL MEETING

of the

Maryland Agricultural Society
Maryland Farm Bureau Federation

BALTIMORE, MARYLAND

WEDNESDAY AFTERNOON

JANUARY 8, 1930

The First Session of the Fourteenth Annual Meeting of the Maryland Agricultural Society, The Maryland Farm Bureau Federation, held in the Ball Room of the Lord Baltimore Hotel, Baltimore, Maryland, convened at two-thirty o'clock, President James W. Davis presiding.

PRESIDENT JAMES W. DAVIS: The meeting will come to order.

Ladies and Gentlemen, Fellow Farmers, I will introduce to you as your presiding officer for this afternoon's session, Mr. E. Thomas Massey, Vice-President of the Maryland Farm Bureau Federation. I don't believe Mr. Massey really needs an introduction to this audience at all, but then it is usually done that way.

CHAIRMAN MASSEY: Mr. President, Ladies and Gentlemen, Fellow Members: I will try to keep order. I am not going to make a speech because we are a half-hour behind schedule. I think we ought to rush this business along, because some of you fellows have to go home to milk.

. . . Song, "America" . . .

CHAIRMAN MASSEY: The next thing on our program will be the Annual Address by our State President. It gives me great pleasure to introduce to you Mr. James

W. Davis, of Harford County, President of the Maryland Farm Bureau Federation. (Applause.)

PRESIDENT DAVIS: In opening this, our Fourteenth Annual Convention, I am going to depart somewhat from my usual custom. I have a speech written up in some sort of shape. I don't know whether I can deliver it or not. I think I would probably do better to throw it away and just talk from my heart, but at the same time, sometimes these things have to be done in a certain formal way, and if you will have a little patience with me, I will do the best I can with it.

PRESIDENT'S ANNUAL ADDRESS

BY JAS. W. DAVIS

Rocks, Maryland

Ladies and Gentlemen, Delegates and Visitors to the Fourteenth Annual Meeting of the Maryland Agricultural Society, Maryland Farm Bureau Federation: The report of the secretary-treasurer, which will be given by Mr. Stewart, will show you the excellent progress your organization has made in the past year, and for that reason I shall devote my remarks to some of the problems we shall have to deal with in the coming year. I think it is proper, however, to first mention a few things that have in a great measure prepared the way for the things that should be done during the present year.

The A. F. B. F. has been largely responsible, by working with other farm organizations, for the passage of laws which, if supported by the farmers of the nation, will go a long way to put the farmers on an equality with other groups. This success has been achieved only after years of strenuous effort on the part of the national organization and earnest assistance by state and county organizations. This work may be compared to plowing and preparing a field for a crop, and now, after this work has been completed, the big thought is—have we the courage and energy to go forward and sow the seed on the

land which we have prepared with so much labor and care and so put ourselves in position to reap the reward due us.

I am sure I can say that we have this courage. I am sure that each one of us, looking back at what we have accomplished in the years that have passed, will say I have started to do this job, I will not turn back nor stop until it is completed and I reap the reward of my labor.

I believe we farmers are in a stronger position today than we have ever been in. We have convinced the nation that we have not had our just share of the national income and we have achieved a position from which we do not have to ask as beggars for a pittance, but can stand up as men and demand our position of equality in this great nation.

The Act of Congress which was passed in 1929, after seven years of constant effort on the part of the Farm Bureau, the Grange and other farmers' organizations, was passed only after these organizations had gotten together and agreed on the bill all could support. Congress had often said to the farmers, "We cannot help you unless you agree among yourselves," so you see that the farmers' organizations were compelled to co-operate among themselves before legislation to help them could be passed, and the Act, when passed, still calls for co-operation, because it provides for assistance only to co-operative marketing associations.

We in Maryland, several years ago, learned that co-operative marketing was the best way to market our produce, for we have the Maryland State Dairymen's Association, the Maryland-Virginia and the Tri-State Associations, which have been successfully marketing our milk for several years. We also have the Maryland Tobacco Growers' Association, which is an example of a successful tobacco marketing association.

We also have the Agricultural Corporation of Maryland, which has been doing a large business in co-operative purchasing, and which is now taking steps to give our farmers additional service by taking membership in

the Farmers' National Grain Corporation, which is the organization set up by the Federal Farm Board to market the wheat produced in the United States.

We do not expect to perform miracles by this move, but we do feel that we can make the farmer a few cents per bushel on the price of his wheat. We can, also, by taking this step, support the Federal Farm Board in doing the job that has been mapped out for it in the Farm Relief Act.

The Farm Board has told us plainly that if they are to be of any assistance to the farmer, the farmer must co-operate with them and give them his support. In other words, this marketing should be done by co-operative associations, managed and controlled by the producers of the different commodities, and to do this we feel that it is our duty to give the Federal Farm Board our full support by forming our co-operative associations here in Maryland.

As, no doubt, most of you know, we had a committee appointed consisting of Dr. Symons, Dr. Bomberger, Messrs. A. G. Ensor, D. S. Pearce, M. Frank Holter, E. Thomas Massey, James W. Davis and M. M. Stewart, which represented practically all the farmers' organizations in this state. After carefully considering the matter and being advised by Dr. Bomberger and later by the Federal Farm Board, through its members and attorney, it was unanimously decided that The Agricultural Corporation of Maryland should take up the marketing of grain for the farmers in this state. To that end we have made application for membership to the Farmers' National Grain Corporation.

This action was taken because The Agricultural Corporation of Maryland had been set up years ago by different farmers' organizations and has always had their support. We felt that the matter of marketing grain could be handled at a lower cost and return a higher price to the producers than under any other plan, because The Agricultural Corporation already is doing a very large business in this state. Its overhead is already taken

care of through the commodities it is selling, and to take on the marketing of grain would add very little to the expense of the organization. We purpose, just as soon as the Grain Marketing Corporation has perfected its plan to make the closest connection possible with them, and in that way pass all the benefits to be had from such connection on to our farmers.

I believe that one of our largest tasks in the coming year is a matter of education. While our farmers have been used to co-operating to a certain extent, and I think have been very successful with this co-operative association, there is still a great deal of individualism among us, and it will be our duty to educate our farmers to co-operate more fully with all these marketing agencies. While we have had ample evidence of the increased bargaining power of an organized group as compared to the individual, there is still a lot of educational work to be done along this line. I feel that if we could carry this education far enough to make each producer realize that it is for his own personal benefit to organize and support his organization in every way, that we could go forward with a stronger feeling of success than we have been able to do in the past, and in order to get the full benefits of the legislation that has been passed, we have certainly got to get ourselves educated to this point.

Another of the important problems is the tariff. We have always felt that the farmer has been discriminated against in our tariff laws. The makers of these laws have built up a high tariff wall around this country so that nothing could come in that was manufactured at a lower cost than it could be profitably manufactured in this country, but the farmer has been compelled to pay these high prices and at the same time sell his produce in competition with the cheapest labor and cheapest land and the lowest standard of living. In other words, the world market sets the price of our export commodities, the price received for these exports practically sets the price that we receive at home, so that the farmer has been compelled to pay the price that is high for everything he

buys and at the same time sell on the world market with no protection whatever.

The last session of Congress was called to enact Farm Relief Legislation and possibly adjust the tariff. The very important problem before us at the present time is to see that through the tariff legislation to be passed at the present session of Congress we are put on an equality with the rest of the nation, and that is going to take hard work, co-operation and eternal vigilance, and a very large part of this burden will have to be borne by the American Farm Bureau Federation, which brings us to the relationship between our state organization and the national organization. Just as our state organization would have no strength without good, strong, active county organizations, so a national organization will absolutely fail unless it is supported by strong State Farm Bureaus, so you can see that while as individuals we may say this matter does not concern us, yet when it is analyzed you will find that no farmer can say this matter does not concern me because without the full support of the united farmers of America this job cannot be brought to a successful issue.

I might cite as an outstanding example of co-operative marketing in this state The Maryland State Dairymen's Association, which is acknowledged by all co-operative associations marketing dairy products to be the very best organization for this commodity that has been conceived. It has grown from a small beginning until it has reached the point when it is acknowledged to be at the pinnacle of success.

Another thing that gives us a good deal of encouragement is the very cordial and helpful assistance of the extension service. This service is recognized as being one of the most efficient and well managed organizations in the country, and working, as we have done with them for the whole period of our existence, we have always realized that we have had real support and assistance.

Another thing that I wish to bring to your attention

is the matter of improved roads. While our state road system is one of the oldest and one of the best, there is still a large amount of work to be done. If we are to have the close connection between the country and the town and city that we should have, because we are coming more and more to the place where there is no difference between the city and country, we must have more improved roads, or, in other words, farm-to-market highways.

The time when the farmer's means of communication with the outside depended on horse-drawn vehicles is past, and the motor car and the truck have changed conditions so that persons living 35 or 40 miles from Baltimore city are in more direct contact with the city today than they were a few years ago with the local towns. This is a great benefit to both city and country people. It places the country people in direct contact with the city merchants, and while the matter of good roads has always been looked upon as a proposition that interested only the country people, today it is just as beneficial to the city folks, so that the time has come when it is very difficult to draw the line between the city and country. The city dweller, in the course of an hour or so, can be in a remote part of the country, and the country dweller, in the same short time, can be in position to receive all the benefits that the city dweller receives, and we feel sure that this will prove of much benefit to both classes of our citizens.

Our schools are no longer the little one-room school houses teaching seven or eight grades, and giving in the end but a meager education. Our counties today are enjoying also the same educational advantages that the city folks have previously enjoyed, and this will be very much to the benefit of the folks who live in the country.

I find in my travels over the state that interest in the Farm Bureau is very much increased and it is resulting in an increased membership, which is one of the important things, for the slogan of the Farm Bureau for the

last two years has been, "There Is No Substitute for Membership," and I see no reason why this membership should not continue to be on the increase. Through this increased membership we shall be able to give constantly increasing service to everyone who is closely connected with farm life, so in summing up the whole matter, it seems to me that the future looks very bright for the farmer. I believe that he will be in better position to help himself and work out his own problems through organization in the future than he has been in the past.

I might at this time read you a telegram which I received this morning from the Farmers' National Grain Corporation. We (the Agricultural Corporation of Maryland) made application to them for membership in their organization, and this is the telegram I received this morning:

"It is our present opinion and that of our attorneys that you are in every way qualified to become a stockholder in this Corporation, and we believe formal approval will be given at once upon receiving a certified copy of amendments which you are adopting tomorrow." Signed by the Farmers' National Grain Corporation. (Applause.)

I might say that at our meeting this morning those amendments to the charter of the Agricultural Corporation of Maryland which were necessary to put us in a position to take membership were unanimously adopted, and in a very short time we will be in full membership and in a position to pass out to our Maryland farmers any benefits that can be secured from that connection. (Applause.)

CHAIRMAN MASSEY: The next thing on the program is the report of the Secretary-Treasurer of the Maryland Farm Bureau Federation, Mr. M. Melvin Stewart. (Applause.)

ANNUAL REPORT OF SECRETARY-TREASURER

M. MELVIN STEWART

FOR 1929

Mr. President, Fellow Farm Bureau Members, Ladies and Gentlemen: For the seventh time it is my privilege to report to you an account of my stewardship as the secretary-treasurer of the Maryland Agricultural Society-The Maryland Farm Bureau Federation.

The year 1929 will go down in the history of America as marking the beginning of a new era in the agricultural and economic development of the United States.

As we look backward we can view the various steps in the growth of American Agriculture. First came the Act of Congress, known as the Morrill Act, which provided for the establishment of the Land-Grant Agricultural Colleges.

Next came the Hatch Act, establishing the Agricultural Experiment Stations. Then came the problem of making available to farmers out on the land the store of information already known and constantly being developed at the Agricultural Colleges and Experiment Stations. The passage of the Smith-Lever Act, establishing the extension service work, provided part of the solution.

As most of the high schools were located in the town centers and as practically the entire course of study in these schools catered to the needs of the town and city folks, it was soon found that the large majority of country raised boys and girls entering high schools were lost forever to the farm.

The passage of the Smith-Hughes Act established vocational agricultural instruction in the high schools in an endeavor to stop this loss to rural America.

Then in rapid succession came the Farm Loan Act, the Intermediate Credits Act, and the Capper-Volstead Act. This last one legalized and sanctioned Co-operative Marketing and Purchasing for the farmers.

But with all this legislation the lot of the farmer economically became worse and worse. He was still an individualist, trying to compete with the other organized groups such as industry, labor and finance. In fact all other groups were organized and profiting as a result of group action. The farmer remained the individualist, selling or dumping his product in competition with his fellow farmers in an unprotected market and buying at retail in a highly protected market. In other words, saying to those who wanted his product "what will you give me for this corn, or tobacco," and then saying to the feed, fertilizer or implement manufacturer, "how much do you want for your commodity?" As a result he sold "cheap" and bought "dear," and to balance the losses sustained under such a system the mortgage indebtedness of Agricultural America increased by leaps and bounds.

Farm Marketing Act

For the past nine years the American Farm Bureau Federation has kept up a constant battle to secure for the farmers of America "Equality for Agriculture." Your state organization, as part of the big Farm Bureau machine, has kept constantly hammering away on our sector of the battle front. As a result of the fight of the Farm Bureau, in co-operation with other farm organization groups, the McNary-Haugen Farm Marketing Act, in a form somewhat amended from the original bills, was passed by a special session of Congress, called to convene in March of 1929 by President Herbert Hoover.

This Act provided for a Federal Farm Board to administer its provisions and to have charge of the $500,000,000 fund placed at its disposal. At the request of President Hoover, acting through his Secretary of Agriculture, the Maryland Farm Bureau was requested to suggest outstanding farm leaders, with a knowledge of co-operative marketing, for a membership on this board.

One of those suggested by us, namely, Mr. C. B. Denman, is to address us tomorrow afternoon.

National Marketing Commodity Co-operative

The program of this board, as I know of it from personal statements by various members of the board, is to set up National Marketing Co-operatives for each of the major commodities. Three of these have already been created and incorporated—namely, for grain, cotton and wool. Others are in process of formation, such as tobacco and livestock. The fruit and vegetable situation is likewise being studied.

Wheat Marketing

The problem before your Maryland farm leaders has been how the grain marketing interests of Maryland farmers could be best served under this new program of the Federal Farm Board.

On Monday, July 15th, a special conference to consider this problem was held by the Board of Directors of this Federation, the Executive Committee of the Maryland State Grange and the officers of the University of Maryland. Dr. Thomas B. Symons was named presiding officer, and your secretary the secretary of the conference.

A special committee, representing all three organizations, was appointed to carry on the study of the problem and to bring in a recommendation. After many meetings this committee recommended that the Agricultural Corporation of Maryland be used as the Co-operative agency for the marketing of Maryland grain, and further that the certificate of incorporation and the by-laws of the corporation be amended to meet the provisions of the Capper-Volstead Co-operative Marketing Act as required by the new Farm Marketing Act.

Conferences have been held by your officers, Mr. Davis, Mr. Massey and myself, with Mr. W. H. Settle, chairman of the National Grain Marketing Committee and later with the management of the newly organized Farmers' National Grain Corporation.

Since then, at the direction of the Farmers' National Grain Corporation, the Agricultural Corporation of

Maryland has made application for membership as the Maryland agency of this Federal sponsored National Grain Marketing Corporation. It is hoped that many of the details involved in a matter so big can be so handled as to enable us to begin the marketing of some of this year's grain crop.

Wool Marketing

Your secretary was invited by the Federal Farm Board to meet in Chicago on October 4th and 5th with others representing the Co-operative Wool Marketing Associations of this country.

As a result of this conference, which was attended by five members of the Farm Board, namely, Chairman Legge and Messrs. Stone, Williams, Denman and McKelvie, a special committee was appointed to incorporate and serve as the first Board of Directors of the National Wool Marketing Corporation.

Your state organization again operated its wool pool as in the past years. Each week a guaranteed price was named for the following week's delivery. This wool was sold for Farm Bureau members at the low cost of one-half cent per pound and for non-Farm Bureau members at one cent per pound.

As a result, the wide spread between country prices and city dealer prices that prevailed prior to the existence of the pool continued to be held at about two cents per pound, instead of the usual five to ten cents.

Although the wool pool does not handle the volume of the clip to which it is entitled, it has been the means of raising and maintaining a higher price level throughout the state, and thus has brought thousands of dollars into the pockets of our sheep men.

Co-operative Purchasing

Under the active leadership and able management of our worthy president, Mr. James W. Davis, the Agricultural Corporation of Maryland has continued to make greater progress and render a larger service in its sup-

ply business of feeds, fertilizers, seeds, twine, etc. Its financial position is greatly improved, and in the confidence of the farmers of the state it is standing "ace high." From about $70,000 of business in 1922 it has this year done over $1,000,000. With present orders in hand, 1930 should show a total business in supplies alone of $1,500,000.

With the inauguration of the Grain Marketing Department of the Corporation the total volume of business should greatly increase.

Automobile Insurance

In the spring of 1928 the Farm Bureau inaugurated a new service—that of automobile insurance. This is sold only to those living on the farm. The rates are based on the auto insurance loss experience of the farmers. Also by eliminating renewal commissions to agents the rates charged have reflected a saving of from 40 per cent to 50 per cent over old line company rates.

To date 6,083 policies have been written since the inauguration of this service in 1922. Our policyholders have had 742 claims. The insurance company has sent approximately 45,000 pieces of direct-mail literature to prospects, and our 78 agents have called on approximately 15,000 persons. All of this has been of value in bringing the Farm Bureau and its services to the attention of the farmers of the state.

State Legislation

As a result of very definite resolutions passed at our annual meeting last year, your secretary, as your legislative representative, made an effort to secure the enactment by our State Legislature of legislation putting those resolutions into effect.

First—In one resolution you voiced your opposition to any change in the Gasoline Tax Law. I can report that no change was made at the last session.

Second—You requested the enactment of a law providing for the licensing and bonding of commission merchants.

Such a bill was introduced by Senator Withgott of Talbot County and duly passed by the legislature, but was vetoed by the Governor.

Third—You favored the enactment of legislation that would make possible the registration of ownership of automobiles and the issuance of all licenses pertaining thereto at the county seats of the respective counties.

The automobile dealers of the state had a bill introduced providing for four branch offices of the automobile commissioner's office, to be located at Hagerstown, Silver Spring, Elkton and Salisbury.

This was later amended to provide for a branch office in each county. In the closing sessions of the legislature this bill was again amended and this work assigned to the respective County Clerks of the Court on a fee basis. In this form it passed the legislature. The Governor also vetoed this bill.

Fourth—In another resolution you voiced yourselves in favor of an enlarged State Police force—said force to be given full police powers.

Such a bill was drafted and introduced. Strange to say, it met the opposition of the Automobile Commissioner, even though it meant an enlargement of both the personnel and of the appropriation for his office.

The administration showed their opposition to this measure also.

Transportation Problems

Your state office has had several transportation problems confronting it. The Pennsylvania railroad gave notice that it proposed to close quite a number of its stations as agency points. Upon request from our various County Farm Bureaus, our attorney, Mr. John H. Hessey, appeared before the Public Service Commission of Maryland to oppose these proposals. With several exceptions, the railroad company was required to continue their agents at these stations.

Upon request of the Talbot County Farm Bureau we undertook to secure for the Eastern Shore, first, a sto-

rage-in-transit rate at Baltimore on all rail-grain shipments from Eastern Shore of Maryland points; second, a reduction in the all-rail rate on wheat from points on the Baltimore and Eastern Railroad between Claibourne and Ocean City, Maryland, to Baltimore.

On the first proposal we have been unsuccessful so far, as the railroad suggests that all shipments of grain from Eastern Shore points should route via Norfolk, Virginia, rather than Baltimore. Under their proposal such cars of grain could be stopped at Norfolk for export shipment or else rolled on through to Southern mills.

We are not exactly satisfied with this proposal and will continue the matter further.

On the second proposal we secured a three-cent per bushel reduction on wheat from Baltimore and Eastern railroad points between Claiborne and Preston, Maryland, to Baltimore.

The railroad in putting these rates into effect, met water competition, and likewise changed its routing via Salisbury to via Easton, Maryland, in order to prevent a fourth section violation.

Two other transportation matters are likewise having our attention. The railroads have moved to abolish the present lower rates on stocker and feeder cattle from Baltimore to Maryland points and to substitute therefore the higher rates now applying on fat cattle.

The other applies to the present rate on fertilizer. All other freight territories carry a much lower ton mile rate on fertilizer than that prevailing here in trunk line association territory.

Working through the Transportation Department of the American Farm Bureau Federation we are striving for a substantial reduction in fertilizer rates.

Membership Organization Work

The year 1929 saw the Farm Bureau in Maryland confronted with the problem of renewing its membership contracts with its members. The second three-year period expired in 1929.

Through the American Farm Bureau Federation we secured two experienced membership men—namely, Mr. C. H. James of Illinois and Mr. H. W. Bowen of New York. These men, working with the assistance of good, loyal county Farm Bureau officers and members, went out in a number of counties and renewed, and also increased our membership in those counties.

However, we have not been satisfied with borrowing organization membership men from without the state. We have felt the need of some full-time men of our own, hence as soon as we had the money available we have employed two able, earnest men, trained in Maryland Farm Bureau work, for the job of maintaining and enlarging our membership. These men are Edward H. Sharpe, of Frederick, Maryland, and H. E. Holsinger, of Ridgely, Maryland.

I am glad to report that our payments of membership dues to the American Farm Bureau Federation was larger in 1929 than in 1928, thus showing that we are on the up grade in membership.

I feel that there exists a greater confidence in the Farm Bureau throughout the state than for some years. Our various services have demonstrated that we are doing the job and with support will continue to carry on for our farmers.

New State Office Location

For some time, with the growth of our activities, we had found that our old office quarters in the Union Trust Building were no longer adequate for our requirements. Likewise, the automobile parking problem in the downtown section had become so acute that our farmer members found it difficult to park their cars when desiring to visit the state office.

So, on May 29th, we moved to new quarters in the Sherwood Building at the northeast corner of Charles Street and North Avenue. This was done without any

increase in our expenditure for rent. We secured practically double our old floor space and likewise got away from the parking problem.

Miscellaneous

I have tried in this report and in the time available to bring to your attention the most important items which have engaged our attention. There has been a multitude of miscellaneous matters that have occupied our attention which cannot be mentioned at this time.

Appreciation

Before closing, I must express my appreciation of the many courtesies and the fine co-operation of our president, Mr. Davis, our vice-president, Mr. Massey, from the directors of the State Federation, from the various county Farm Bureaus and commodity organization officers and from our friends in the extension service and the vocational agricultural service. Likewise for the fine service of our entire staff of employees.

Treasurer's Report

In spite of enlarging our work and our personnel somewhat during the year, with the added increased cost, I am happy to say we have lived within our income and closed the year with a bank balance more than twice that of last year.

CHAIRMAN MASSEY: That is a very fine report, especially as to money in the bank. We will have to get Mr. Stewart to tell you farmers how to have that much money in the bank the last day of the year.

We are very fortunate to have so many people at this meeting. I was very nervous when they put me up here, but I am getting over it a bit. It does one good to look at so many faces. This certainly is a nice meeting, and we hope you will enjoy every session and profit by them.

Maryland Agricultural Society-The Maryland Farm Bureau Federation

Statement for Period From January 1, 1929, to December 31, 1929

RECEIPTS

County dues	$ 7,065.00
Subscription to (Co-op.) Bureau Farmer	1,185.50
A. F. B. F. dues	1,185.50
Associated membership dues	180.00
Non-Farm Bureau county membership dues	144.25
Interest earned	55.35
Wool Pool Marketing	72.65
Publicity advertising	1,047.32
Farm Bureau organization—refund from counties	1,068.69
Office expense—refund	35.78
Annual meeting 1929	797.50
Bonding expense	45.96
Rent—from sub-let space to affiliated associations	1,133.68
A. F. B. F. news letter	2.00
Auto. Insurance Commission	4,564.71
Auto. Insurance renewals	1,891.00
Total income for period	$20,474.89
Bank account January 1, 1929	1,237.21
Available cash	$21,712.10

DISBURSEMENTS

Furniture and Fixtures	$ 360.38	
Farm Bureau organization	3,011.24	
Wool Marketing	72.65	
Board of Directors expense	444.70	
Traveling expense	1,190.04	
Salary Secretary-Treasurer	3,600.00	
Salary Stenographer	1,560.00	
Salary Clerks	432.50	
Salary Publicity	360.00	
Salary Accountant	160.00	
Publicity	1,054.54	
Dues A. F. B. F.	1,162.50	
Office expense	1,199.34	
Rent, Telephone and Telegraph	2,053.76	
Annual meeting expense 1929	801.45	
Annual meeting expense 1930	153.50	
Bonding expense	66.60	
Ford Automobile	618.39	
Automobile expense	58.10	
Executive Committee expense	57.27	
Total disbursements		18,416.96
Bank balance December 31, 1929		$ 3,295.14

We are also fortunate this afternoon to have with us the Executive Secretary of the American Farm Bureau Federation. It gives me great pleasure to introduce to you Mr. M. S. Winder. (Applause).

ADDRESS

BY M. S. WINDER,

Chicago, Illinois

Mr. Chairman, Ladies and Gentlemen: I feel that I am peculiarly fortunate in being privileged to meet with you again this year, since it was my privilege just last year to represent the American Federation at your meeting.

As an officer of the American Farm Bureau Federation I feel that it is a great advantage to meet with as many of our state organizations as I possibly can, and to meet with as many county organizations as I can, in order that I may keep in close touch with the people for whom I work. I feel confident that I can serve you to much better advantage if I know the things that you are thinking, if I appreciate your problems, if I am familiar with the approach that you are making to them, and for that reason I feel that it is most fortunate that I am privileged to attend your meeting and have a part with you here.

I remember a few years back in launching a membership campaign that we went out to talk to our prospective members about the great things that we had accomplished, and to our dismay and amazement we found that the farm people were not particularly interested in the things that we had done, but they were very anxious to know what we proposed to do. And so we reached the conclusion that in a farmers' organization the membership and the prospective membership regards the accomplishments of the past as important only in that those accomplishments give them a guarantee of our ability to do worthwhile things in the future.

I am not going to take your time today to give a report of our stewardship. I am going to be content merely to say this, that the past year has been the best one that the American Federation has ever known, both from the standpoint of membership, finances and accomplish-

ments. A perusal of the annual report of the American Farm Bureau Federation will bear out these statements, and I urge that you all secure copies of this report and study it at your leisure, so that you may know what your national organization has done.

I propose now to talk to you about our program for the present year. I feel that that is the thing you are most concerned in. Both President Davis and Secretary Stewart have mentioned the fact that in the past year there has been enacted an agricultural marketing act. This, I believe, is the cornerstone of future agricultural prosperity. I am pleased with the fact that that act provides for the creation of a Federal Farm Board, and that there is a very generous appropriation of money to be used as a revolving fund to loan money to co-operatives as they need this money. But more important than the creation of the Board, more important than the provision of that vast sum of money, is the declaration of policy in that act wherein it is declared for the first time in American history that co-operative marketing is the accepted American agricultural marketing policy.

That statement, my friends, is the most important declaration within the agricultural marketing act and marks the greatest achievement in agricultural legislation during the past year and many years preceding that. (Applause.)

Believing that co-operative marketing is fundamentally sound, the American Farm Bureau Federation has, during all of its history, given staunch support to the co-operative movement. We have assisted in the development of co-operative organizations wherever our services have been asked for. We have initiated several co-operative endeavors that have been exceedingly successful, and fortunately, we have also had the experience of helping to initiate some co-operative enterprises that have not succeeded as we should have liked them to succeed.

We are this year giving our full support to each co-operative enterprise as it is launched. We are going

out into the field to help set up new co-operative associations through which the farm people are going to be able to secure the benefits of our agricultural marketing act. Let no one be mistaken. There is no competition between the Farm Bureau and the co-operative associations. We ask that every farmer join the co-operative association which is handling the commodities which he produces, and we ask in turn that every farmer join his Farm Bureau in order to share in the duties that lie before the general farm organizations. (Applause.)

As our farm people join the co-operative associations, let me suggest that it is not enough merely to accept membership in these splendid institutions; it is not enough merely to sign a marketing agreement, and then to deliver up products to your organization; it is necessary that you take an active and an intelligent interest in the operations and in the business of that co-operative association if you would be a good co-operator, and if you would assure the full success of the organizations that you join. Do not feel that because you have elected a Board of Directors and because you have employed able managers that your responsibility to the organization is concluded. More co-operative associations have failed because of the discontinuance of active intelligent interest of the membership than for any other single reason.

When a member joins a co-operative association he goes into it for the purpose of improving his marketing facilities, for the purpose of joining with his neighbors in a great endeavor to make more money out of this business of agriculture. See to it that the men you select on your boards of directors are devoted to the business at hand. See to it that they, in every deed, direct the affairs of the organization, not leaving it entirely in the hands of the manager they might employ. As an employee of an agricultural organization let me say this, and I feel that I am qualified to speak this way, that the responsibility for the success of any agricultural organization, be it farm bureau or be it co-operative association, must rest in that organization being directed by the

men and the women who are elected for that purpose. When you accept a place on the board of directors of a co-operative association or a farm bureau, you must remember that you are accepting a responsibility which you alone can faithfully discharge.

We have discovered that through co-operative effort we are able to dispose of our products to better advantage. Another phase of co-operation has to do with the purchase of our necessary farm supplies. Great business institutions have made profits because they were able to mobilize their buying power so that they could buy in great bulk the commodities which they deal with. No individual farmer is able to purchase supplies in sufficient quantity to enjoy the benefit of mass purchasing. For that reason it is necessary that farm people should unite together in their purchasing so that through bulk purchases they are able to control, in a measure, not only the price of the commodities they must buy, but the quality and the condition of those commodities as well.

During the past summer we held at National Headquarters a conference of officials of farm bureau supply companies. There were 23 state farm bureaus represented at that meeting, the supply companies of which were doing business ranging all the way from about $1,000,000 to $50,000,000 a year. In that meeting, composed of representatives of farm bureau purchasing departments, the total business done by those organizations exceeded a quarter of a billion dollars annually. Surely the farmers are engaged in big business when their co-operative purchases equal a quarter of a billion dollars annually, and when you consider further that this co-operative purchasing activity is at the most not more than eight or nine years old. In the State of Indiana alone the supply department has returned to farm bureau members patronage dividends from the sale of fertilizer in excess of $500,000. More patronage dividends have been returned to the farmers of Indiana than the amount the Farm Bureau has collected from its members in the eleven years of its experience.

Since we are finding that this activity is sound and returns a fair profit, it behooves us to investigate it still further as to its possibilities and determine the full extent to which we can go, both in co-operative selling and in co-operative purchasing.

A matter which has engaged the attention of farm people during the past year or two is that of farm taxation. Years ago, when most of our commonwealths were established, there was but one form of property, and that form of property for the most part paid the income of the people. That was tangible property—real estate, houses, stocks of merchandise, livestock, the tangible things that you could see and feel. And yet, with our rapidly developing civilization, this situation has changed completely. Over in our State of Illinois at the present time, we discovered in making a survey as to the source of income that all tangible property pays less than ten per cent of the income of the people of the state. Intangible property such as stocks and bonds and mortgages pays about ten per cent of the income of the people of the state. Personal effort, including salaries, professional fees, etc., pays more than 80 per cent of the income of the people of Illinois.

Yet, when it comes to the matter of taxes for the sustenance and the maintenance of government, we discover that tangible property which has ten per cent of the income pays 93 per cent of the taxes. Intangible property, which has about ten per cent of the income, pays seven per cent of the taxes. Personal effort, which brings more than 80 per cent of the income of the people of that state, does not pay one dollar of taxes.

I am wondering how long the owners of tangible property can go on at that rate without experiencing confiscation of their property. And so the problem before us with regard to taxation is this—that we shall acquaint the people of our communities with the facts, not arraign the farmer against the city home owner, not saying that the farmer is more aggrieved than is the owner of the business block, but rather to develop the facts,

and on the basis of facts ask that all shall be treated with equity and justice, with favoritism to none, and fair play for all! (Applause.)

I submit to you that the day of special pleading for farmers is past. We want complete information regarding each problem that confronts us. Then we want to disseminate that information, and depend upon the fairness and the honesty of all of our neighbors and the people living in our communities to join with us in getting that which is right. The mere fact that I am a farmer does not justify me in saying that I am being imposed upon except as I am able to give the evidence and the proof of that fact, and then having demonstrated the fact that I have been imposed upon, ask that I be given justice.

This matter of taxation we are urging. Each of our state and county farm bureaus is urged to take this up actively and aggressively, calling to your support and assistance the state taxing officials, the research departments of your college, all of those agencies that are equipped to develop facts, and then to disseminate knowledge concerning that which has been developed through research.

It is an interesting fact that since the advent of the automobile we have built some magnificent boulevards throughout the country. Most of our large cities are connected up with good paved highways. The difficulty is that we have not been able to go far enough with this highway development. It is expensive, and our resources have not been sufficient to meet the demand. I was told just lately that for every automobile being operated in the country at the present time there are just 85 feet of improved hard-surfaced roads. To those of us living near the larger cities we realize that that is indeed true, because every time we drive out on the highway we find that the traffic is almost impossible to get through.

The farm people are not so much interested in having great super-highways run through the country if they are in the position that over 90 per cent of us are where

for two or three months in the year we cannot get from our farmsteads onto the highways at all. It is a fact that more than 90 per cent of the farmers of America live at the present time on unimproved dirt roads which for two or three months in every year are practically impassable. Just a little over five per cent of our farm people have direct access to improved roads the year around, and yet in most of our states, we go spending millions and millions of dollars for the development of super-highways, and are content to see the farmer remain stuck in the mud, unable to get his vehicles out of his own yard! (Applause.)

When you stop to realize that people from the larger cities and towns are constant users of all of the improved roads of the country, when you find cars from far places driving along your country lanes whenever they are passable, it leads us to this conclusion—that there should be substantial aid given from Federal and State funds for the improving of farm-to-market highways. We are insisting—not trying to prejudice at all the further expansion of a super-highway system, but rather feeling it imperative for getting the farmer out of the mud with insisting that there be allocated a fair proportion of the gasoline taxes, and of all other appropriations made for road building, for the construction and the maintenance of county and township highways that will give immediate access to good roads to a majority of the farm people.

There is the important matter of land conservation. One test of enduring civilization has always been the ability of the people of any country to maintain the fertility of the soil. The research departments of the land grant colleges, and the extension service of our colleges have carried on a constant effort to indicate to us the best means of maintaining this soil fertility. And yet, I wonder sometimes if we farm folks are fully conscious of the importance of this. There are farms in Europe that have been farmed constantly for a thousand years, that because of a proper preservation of the soil fertility are

yielding more abundant crops today than they have done for generations past.

I have been in communities in the State of Illinois, and I am confident that this maintains in every state in the Union where land that has been farmed for 100 years has been abandoned because soil value has been completely depleted. I am not making any plea for keeping in cultivation the marginal or non-productive land, but on lands that are properly adapted for cultivation it seems to me that we must be given immediate and more consistent and determined effort to maintain the soil fertility of this land.

An important factor is that we shall see to it that the fertilizers which we apply to our soil are properly balanced and are adapted to the needs of that soil and to the crops that we propose to plant. Let me urge of you that you use more extensively than ever before the services of the experimental stations and the extension service in bringing you this important information.

The application of electricity has brought to industry a great revolution. It is found that by the use of this important element the effort and the labor of many hands can be performed by one. We are just pioneering in the use of electricity in agriculture, and yet, I vision that in the future electricity will be just as important to the successful operation of agriculture as it has proved to be in other industries.

A worthwhile Farm Bureau project would be to supply electrical energy to every farm community in the State of Maryland, not only from the standpoint of greater efficiency in our agricultural operation, but from the standpoint of further enjoyment of country home life and some ease from many of the arduous tasks that are part of our labor at the present time.

We are confident that through the changes that are occurring at the present time the income of our farm people is going to be increased. I hope that as that income is increased we are not going out to spend our money in land speculation. I made a remark in a meet-

ing in the State of Iowa not long ago for which I was severely criticized. I stated there that I didn't believe there was an acre of corn land in the State of Iowa that was worth over $300 to anybody, and the real estate agents were all wrought up over it. But I repeat to you that corn land is valuable only in proportion to the amount of income you can hope to secure through careful husbandry. The same is true with respect to every other crop. I have been in California in the citrous belt, where they evaluate groves at $4,000 an acre. That may be justified on the basis of yield that can be secured from those groves, but it certainly would not be justified if the income from that property was not sufficient to give a fair return on that valuation.

Let us refrain from going into land speculation. Let us spend our increased income in improving our farm holdings, and above all in modernizing the farm home so that our women and our children are going to be able to enjoy just the same conveniences and comforts that people in the best homes in the cities and the larger towns are able to enjoy. (Applause.)

I am not familiar with the situation confronting you in the rural schools of Maryland. I want, though, to submit this thought to you for what it may be worth. Inasmuch as so many children from our country districts are drawn away each year into the larger cities and towns, there to take places of responsibility, of leadership, there to do the great tasks that devolve upon alert, keen men and women—since this is the case, and since their usefulness in their mature years is given to the urban centers and to the community, the commonwealth as a whole, would it not be fair that the Federal Government and the state governments contribute very liberally to the maintenance and the support of rural schools which are producing so many people who are making great contributions in mature years to the cities and the towns? (Applause.)

I know there are many who are opposed to Federal cooperation in local affairs, but after all, I am wonder-

ing today just where the boundaries of our community cease. It is no longer possible to continue our activities within our own township, nor within our counties, and indeed, I may say that the entire state is now as one community. What, then, with the new methods of transportation is to be expected in future years but that the entire nation be regarded as a single community in providing for the welfare of our children and in maintaining our necessary institutions.

With regard to this matter of education, one of the greatest advantages that has ever come in education for country people was the development of the extension service whereby the men and women of the rural communities can have brought into their communities by an intelligent, alert man or woman the findings of the experiment stations, the very latest information developed by scientists to be of assistance in directing our affairs. And of equal importance to that is the development of the Smith-Hughes work, so that agricultural instruction is provided in the rural high schools. I wish that every rural high school in America could be provided with an adequately equipped Smith-Hughes teacher whose task it is to instruct our boys in agriculture, in its scientific aspects, in its practical aspects, and above all, as I see it, to provide those boys with a vision of the possibilities in country life and in agricultural endeavor.

Incidentally, those of you who have followed such things will know that whenever a proposal is made for the appropriation of Federal funds to further extension work, to further experimental work, or to further the Smith-Hughes activities, the Farm Bureaus, both state and national, are in the forefront insisting that those appropriations be made.

There are many things that I could say to you regarding the program of the Federation for this year. These several things that I have suggested I feel are of prime importance. Ours must be a forward looking program constantly in advance showing the way to better living

and better life for our country people. I would like to see the time and I hope that I shall, when every farmer would confine his working week to five and a half days and to eight hours a day. I would like to see the drudgery taken out of home keeping in the country districts so that our farm women can live as comfortably and as well as do the women in the best homes in the cities.

These things I believe are going to come, because the farm folks of America today are the most intelligent that have ever undertaken in the history of the world to till the land and make a living from it.

During these years of depreciation I have wondered some times just what the future holds in store for us. I have not been particularly pessimistic because I have felt sure that as the farm folk realized the need for co-operation they would have the intelligence to join together, but now today, in view of the legislation that has been enacted, but even more important than that, from the fact that we are learning to work together, I believe we stand on the threshhold of the best day that agriculture has ever known. We declare that in the accomplishment of the program, that we have developed, that in seeking to achieve our great ideals it is necessary that farm men and women and boys and girls unite together in carrying through this program. And so we declare "There is no Substitute for Membership."

Most of us believe that that is true, but let me add to that this further thought. In addition to there being no substitute for membership, there is no substitute for personal responsibility. Our organization cannot achieve the goal that we have set unless each man and woman in the organization is committed to the task of doing his or her part in carrying through this program. Let there be full cooperation between the people of each community and all the various communities. Let there be cooperation and brotherhood between the agricultural organizations and the cooperative associations which we are all supporting. Let us unite together as one great band

under the guidance and the leadership of intelligent, forward-looking men and women and go forward to the goal that we set, which is, that every farm shall be productive and profitable, that every farm home shall be comfortable and convenient, and that every rural community shall be a delightful place in which to rear our families in contentment and happiness; where there are good schools and satisfactory churches adequately financed, because we cannot live without a spiritual life any more than we can live without the material things.

My friends, if in this great State of Maryland you will address yourselves earnestly and seriously to the accomplishment of these things, I can foresee the day in the not far distant future when country life in this commonwealth will be by far the most desirable form of life that can be found anywhere in the State of Maryland. (Applause.)

CHAIRMAN MASSEY: That certainly was a splendid address. It makes us a little more optimistic. I believe some of us think we might have a chance to make a living on the farm. During the last few years we have not had that chance. It has been quite a puzzle, almost like a cross word puzzle.

Over in my county the other day a man went into the doctor's office and said, "Doctor, I want you to fix my eyes."

"What is the matter with your eyes?"

"I have been working those cross word puzzles so much that I have got one vertical and one horizontal eye." (Laughter.)

I some times think that is what the farmers have. If we make this old Farm Bureau the doctor, maybe we can get our eyes straightened out and see straight, and maybe we will have a chance to make a living.

We will have a presentation of medals to the vocational agriculture boys. I will ask the boys and those who have a part in the presentation of the medals to come up to the platform, and in the meantime, we will have a song.

SECRETARY STEWART: Mr. Davis wishes me to make this announcement in reference to committees.

Credentials Committee:

CHARLES T. COCKEY, JR., *Chairman*
C. DUVALL
C. S. CHESSER
W. FRANK HOLTER
RICHARD BLACKBURN

Resolutions Committee:

E. THOMAS MASSEY, *Chairman*
W. S. SPENCER
CHARLES I. BOYLES
ROY WEAGLEY
R. SMITH SNADER
AMON BURGEE
CARROLL LOWE
J. W. JONES
J. WILSON LORD

CHAIRMAN MASSEY: *Ladies and Gentlemen:* I wish to introduce to you Mr. J. D. Blackwell, Director of Vocational Education of the Department of Education of the State of Maryland. (Applause.)

ADDRESS

BY J. D. BLACKWELL,

Baltimore, Maryland.

Mr. Chairman, Ladies and Gentlemen:

As some of you will recall, I had the opportunity of attending your banquet last year and speaking briefly on vocational education in Maryland, and so this afternoon I shall not take up your time in explaining just what is meant by vocational education in Maryland.

We are grateful to Secretary Winder for his splendid remarks relative to the importance of instruction of this

type in the high schools as well as the rural schools throughout the United States. It is significant, I think, however, for you to know that we have vocational instruction in approximately one-third of all the high schools in Maryland. This movement is a new movement beginning in 1917, and when you take into consideration the fact that we had but $5000.00 with which to put on our program for the first few years, and that at the present time we have but $15,000.00 and that has to be divided between three types of work and instruction—home economics instruction and education in the cities, in the City of Baltimore largely, you can see we have not a lot of state money given over to this particular phase of the work.

Regardless of what you think about Federal aid to education and to other agencies in the state, I want to say it would be very difficult for us to keep this type of work going in Maryland on state money only, because with the $15,000.00 you can see it won't go so far. However, we do get an appropriation from the Federal Government of $96,000.00 annually for this type of instruction.

One method of instruction of all the vocational work, and the thing we stress perhaps most of all, is actual production, or rather, actual practical experience on the part of these boys and so we say that each of these thousand boys, and these boys here represent the thousand boys in Maryland who are taking agricultural instruction in high school—we say that each of these thousand boys should carry on some actual work in a farm project.

Now the term "project" will mean just about as much to each individual as we have individuals. For instance, when the ladies talk about project, they may talk some times about the making of a garment or the canning of so much vegetables, etc. Then when you talk to the farmer or the Experiment Station man, it is on a larger scale. But from our angle, it means this, that each of these boys must carry on, for instance, in the dairy project, and these boys here—maybe I can best illustrate that, illustrate what we mean by project by telling you

the scope of the project carried on by these boys here. The dairy boys carried projects ranging from one pure bred calf up to eleven. These prizes are awarded this afternoon on pure bred, registered animals only. We feel there are enough grade animals, and we feel we need better grade animals, but need more pure bred, registered stock first of all. If you don't believe that, go out and try to buy some decent chickens each year, and you will find we need even some standard grade chickens in the poultry line. That applies, I think, to all phases of stock.

I said the dairy project ranged from one pure bred registered dairy calf to eleven, poultry projects 55 to 445, the sheep from 7 to 12, the swine from 1 to 10, corn projects 1 acre to 3 acres, potato project, one-half acre, largely for certified seed purposes, the tobacco projects averaged approximately one and one-half acres each. Those particular examples will give you an idea of just what we mean by project work.

Last year at this time I had no idea we would be so successful, but I want to tell Mr. Secretary Winder that the Maryland Farm Bureau represents an organization that gives one hundred per cent cooperation along with other similar and allied agencies throughout the State of Maryland, and so they have made this program, this part of the program possible because without the cooperation of the Farm Bureau and the other allied organizations, the names of which I shall read, we could not have this state-wide contest.

You may be interested in knowing just what basis the selection of these winners was based on. For instance, in taking into consideration the winners, we took into consideration the number of months the project was carried on, the number of hours of self labor on the project, and we advocate each boy shall do his own labor, his own work. We took into consideration the exhibiting of these projects at the county fairs, whether or not he won on those. We also took into consideration the attitude towards farming, towards cooperation. We also took into consideration his project book, because we believe in cost

accounting, and a boy should keep records of what he accomplishes. We stress full ownership, and give large credit to the full ownership.

Besides this group of boys who happen to be the winners, we have a number of other boys here with six teachers. Not all the schools are here, because school is going on.

It is perhaps fitting that I should speak at this time of one thing, and that is agricultural instruction is one type of high school instruction that actually is self supporting. Harry MacDonald, one of our teachers, made a study on the statistics throughout the United States, and he found that for every dollar spent on agricultural instruction, a boy brings in that much net profit by way of agricultural production.

Without additional remarks, I want to say this, that the medals that are to be awarded to these boys are unique. They are unique in that they are the first medals of this type ever awarded to any group throughout the United States.

A year ago last October there was organized in Virginia what was known as the F. F. V. Virginia is the appropriate state, of course, to have F. F. V.; in the olden days, you know, that meant First Families of Virginia. Now it means Future Farmers of Virginia. So the other states soon caught the idea. In October, 1928, the very year that it was organized in Virginia, Maryland wasn't far behind. We organized our state chapter, our Future Farmers of Maryland, and later in November in Kansas City there was organized what was known as Future Farmers of America.

So these medals have on them F. F. A. representing Future Farmers of America. Below that is a disc representing the different phases—for instance, the dairy medals have a dairy calf, the corn medal an ear of corn, etc. I say these are unique, and they are the first that have ever been delivered in the United States, and because of that, of course, the National Association of F.

F. A. had to approve of these medals which made, of course, some little delay in getting them.

I don't want to do all the talking, but I want to say we are grateful not only to the Maryland Farm Bureau for this splendid cooperation, but following associations: Maryland State Dairymen's Association, Maryland-Virginia Milk Producers' Association, Interstate Milk Producers' Association, Maryland State Poultry Association, Maryland Stockmen's Association, who are giving both the sheep and swine medals, the Maryland Crop Improvement Association and the Maryland Tobacco Growers' Association. We had 100 per cent cooperation. We didn't ask for all the Associations to help us this year. You can count, however, that next year we will be around to see you, and we hope to have 100 per cent cooperation from you.

Presentation of Medals

The grand trophy medal, donated by the Maryland State Dairymen's Association, the Maryland-Virginia Milk Producers' Association and the Interstate Milk Producers' Association, was awarded to Aubrey N. Walters of Gaithersburg High School, Montgomery County, James W. Davis, president of the Maryland Farm Bureau Federation, making the presentation. This award was for having completed the best registered dairy calf project in Maryland.

The silver and bronze medals, donated, in the Baltimore milk shed, by the Maryland State Dairymen's Association, in the calf project work, were awarded to Melvin Wessel of Clarksville, Howard County, and Lester Queensbury of Jarrettsville, Harford County, respectively. These presentations were made by R. Smith Snader, president of the State Dairymen's Association.

The medals donated by the Maryland-Virginia Milk Producers' Association in the Washington milk shed, for calf project work, were won by Millard Hall of Frederick, who captured the silver medal, and Howard Miller of Thurmont, who won the bronze medal.

Other silver and bronze medals in the calf project work, donated by the Interstate Milk Producers' Association, in the Philadelphia milk shed, were won by Edward Polyette of Princess Anne, Somerset County, and Henry Butler of Centreville, Queen Annes County, respectively. I. W. Heaps made the presentations.

In the poultry project work, the medals being donated by the Maryland State Poultry Association, Gordon Umstead of Poolsville, Montgomery County, was awarded the gold medal, Charles Reedy of Jarrettsville, Harford County, the silver medal, and Henry Zimmerman of Frederick, the bronze one. S. M. Horst, president of the association, presented the medals.

In the swine project work, the medals being provided by the Maryland Stockmen's Association, Randall Garst of Frederick captured the gold medal, Ross Myers of Jarrettsville, Harford County, the silver medal, and Noah King of Damascus, the bronze medal. W. R. Harvey, president of the Stockmen's Association, made the presentations.

In the sheep project, also sponsored by the Stockmen's Association, Wiley G. Griffith, Gaithersburg, was awarded the gold medal, Peter Lohr of Accident, the silver medal and Wayne Hamilton of Oakland the bronze. Mr. Harvey also made these awards.

The corn project work was sponsored by the Maryland Crop Improvement Association. The medals were awarded as follows: Randall Garst, Frederick, the gold medal; Richard Pue of Clarksville, the silver medal; Charles Putnam of Frederick, the bronze medal. Professor J. E. Metzger, secretary of the association, made the presentations.

The potato project work was sponsored by the Maryland Farm Bureau Federation and the winners were: Merle Garlette, Friendsville, the gold medal; Wade Umbel and Floyd Umbel of the same town, the silver and bronze medals, respectively. President Davis made the presentations.

In the tobacco project work, sponsored by the Maryland Tobacco Growers' Association, Allie Cooksey, C. Willett and R. Young, all of Baden, were awarded the gold, silver and bronze medals, respectively, Mr. Ranft of the association making the presentations.

REPORT ON STATE APPROPRIATION

The following is a financial statement of the State appropriation made to the Maryland Agricultural Society-Maryland Farm Bureau Federation, approved by the Council and submitted by the treasurer, Dr. T. B. Symons:

Maryland Agricultural Society—Maryland Farm Bureau Federation

Financial Statement for Fiscal Year 1928-1929

Expenditures during 1928-1929:

Check	Payee	Classification	Amount Expended
405	Union Trust Co.	Office rent (October)	$ 52.92
406	R. F. McHenry	Community Ex. (Allegany)	50.00
407	Ethel Joy	Community Ex. (St. Mary's)	50.00
408	Md. Farm Bureau Fed.	Community Ex. (Timonium)	20.00
409	M. D. Moore	Community Ex. (Washington)	5.00
410	Union Trust Co.	Office rent (November)	52.92
411	W. C. Rohde	Community Ex. (Baltimore)	50.00
412	Irene Martin, Secy.	Community Ex. (Washington)	25.00
413	Collington Com. Club	Community Ex. (Colored)	16.00
414	John B. Morsell	Community Ex. (Calvert)	50.00
415	Torsch & Franz Badge Co.	Supplies (Badges)	14.13
416	Hattie E. Brooks	Community Ex. (Dorchester)	25.00
417	Gladys K. Becker	Travel (Washington Grange)	.75
418	Helen I. Maisack	Travel (" ")	4.30
419	Elsie N. Geis	Travel (" ")	2.26
420	Josephine Kapsch	Travel (" ")	2.63
421	O. R. Carrington	Travel (" ")	1.10
422	H. R. Shoemaker	Community Ex. (Frederick)	50.00
423	20th Century Ptg Co.	Printing (Folders, Grange)	17.50
424	Union Trust Co.	Office rent (December)	52.92
425	Thomas H. Bartilson	Community Ex. (Cecil)	50.00
426	L. H. Martin	Community Ex. (Colored)	50.00
427	Ernest W. Grubb	Community Ex. (Queen Anne's)	50.00
428	B. & O. R.R.	Travel (Scrip, T. B. Symons)	30.00
429	M. D. Moore	Travel (Smithsburg)	5.00
430	J. P. Brown	Community Ex. (Wicomico)	36.00
431	M. D. Moore	Community Ex. (Washington)	18.50
432	Jas. E. Diggs	Community Ex. (Colored)	5.00
433	V. H. Daniels	Community Ex. (Colored)	13.00
434	L. C. Burns	Community Ex. (Carroll)	50.00
435	Florence H. Mason	Community Ex. (Wicomico)	14.00
436	Union Trust Co.	Office rent (January)	52.95

Expenditures during 1928-1929:

Check	Payee	Classification	Amount Expended
437	Md. Farm Bureau Fed.	Postage (Annual reports)	50.00
438	M. M. Stewart	Travel (Chicago, an. meet.)	141.17
439	Hyatt Mfg. Co.	Supplies (Buttons, an. meet.)	23.50
440	Md. Crop Improve. Assn.	Community Ex. (Corn Show, Balt.)	250.00
441	W. L. Henning	Travel (An. meeting, Balt.)	36.05
442	H. R. Cox	Travel (" " ")	17.88
443	W. L. Robinson	Travel (" " ")	48.57
444	E. R. Gross	Travel (" " ")	19.03
445	Bessie M. Spafford	Community Ex. (Caroline)	14.70
446	Advertisers' Eng. Co.	Printing (3 engravings)	6.70
447	Charles Adkins	Travel (An. meeting, Balt.)	25.00
448	Charles G. Woolsey	Travel (" " ")	15.00
449	Royal Arcanum Cl. Bldg. Co.	Travel (" " ")	52.50
450	Union Trust Co.	Office rent (February)	52.92
451	John C. Watson	Travel (An. meeting, Balt.)	82.73
452	Wm. Paul Walker	Travel (" " ")	3.67
453	The Alcazar	Travel (" " ")	100.00
454	Lewis M. Lambert	Supplies (Signs, an. meet.)	12.85
455	M. D. Lincoln	Travel (An. meeting, Balt.)	54.52
456	Bessie M. Spafford	Community Ex. (Caroline)	15.00
457	Union Trust Co.	Office rent (March)	52.92
458	E. C. Auchter	Travel (An. meeting, Balt.)	15.86
459	Thomas & Evans Ptg. Co.	Printing (Bee reports)	26.10
460	Union Trust Co.	Office rent (April)	52.92
461	Univ. of Md. Press	Supplies (Cardboard for signs)	1.90
462	United Reporting Service	Printing (Report an. meet.)	253.00
463	Union Trust Co.	Office rent (May)	52.92
464	Henry C. Whiteford	Travel (Meetings, Balt.)	14.58
465	P. D. Brown	Community Ex. (Charles)	50.00
466	Md. Farm Bureau Fed.	Office rent (June)	52.92
467	Advertisers' Eng. Co.	Printing (Line eng.)	2.95
468	Md. Farm Bureau Fed.	Office rent (July)	52.92
469	Hotel Rennert Co.	Travel (Meeting, Balt.)	45.00
470	Railway Express Agency	Express (an. reports)	2.15
471	M. M. Stewart	Travel (Committee meet.)	11.65
472	Hyatt Mfg. Co.	Supplies (Ribbons)	4.91

Expenditures during 1928-1929:

Check	Payee	Classification	Amount Expended	
473	Md. Farm Bureau Fed.	Office rent (August)	52.92	
474	L. C. Worthington	Travel (My Lord's Gift)	18.95	
475	R. M. Watkins	Travel (Tracy's Landing)	13.28	
476	B. & O. R.R.	Freight (an. reports)	2.72	
477	Md. Farm Bureau Fed.	Postage (an. reports)	15.00	
478	T. B. Symons	Other Exp. (Labor, an. rpt.)	65.00	
479	M. M. Stewart	Other Exp. (" " ")	75.00	
480	Elsie Geis	Other Exp. (" " ")	10.00	
481	K. G. Connolly	Other Exp. (" " " and accounts)	60.00	
482	T. B. Symons	Travel (Port Deposit)	19.00	
483	T. D. Holder	Community Ex. (Caroline)	20.30	
484	Whitaker Paper Co.	Supplies (Env. for an. rpts.)	18.36	
485	Hotel Rennert Co.	Travel (Meet., Balt.)	17.00	
486	Md. Farm Bureau Fed.	Office rent (September)	52.92	
487	Railway Express Agency	Express (An. reports)	.49	
488	Hyatt Mfg. Co.	Supplies (Badges)	4.87	
489	George J. Abrams	Travel (Hancock)	20.72	
490	C. S. Richardson	Travel (Community meetings)	52.34	
491	W. R. Ballard	Travel (Tyrone, Pa., Grange)	28.53	
492	Mrs. M. T. B. Johnson	Postage	79.64	
493	Univ. of Md. Storehouse	Supplies (Paper)	46.14	
494	Dorothy Emerson	Community Ex. (Girls)	100.00	
495	Md. Farm Bureau Fed.	Office rent (Pt. payment)	4.93	
496	Art Metal Const. Co.	Supplies (Storage cabinet)	37.88	
		Total expenditures to Oct. 1, 1929, Paid by Treasurer		$3,447.36
		Paid direct by Comptroller's office for unexempted expenditures:		
		Twentieth Century Ptg. Co. (Programs for An. meeting)	$106.02	
		Day Printing Company (An. reports—bound and separates)	981.02	
		Lucas Bros., Inc. (McMillan binders, index sheets, etc.)	465.60	
		Total paid direct by Comptroller's office		$1,552.64
		Grand Total of Expenditures from Oct. 1, 1928 to Oct. 1, 1929		**$5,000.00**

CHAIRMAN MASSEY: I believe that is all. The meeting is adjourned.

THURSDAY AFTERNOON

January 9, 1930

The Second Session convened at 2:15 o'clock, President Davis presiding.

PRESIDENT DAVIS: The meeting will come to order. It is a great pleasure for me to introduce to you the presiding officer for the afternoon session, Mr. J. W. Jones, of Montgomery County. As you all know, Mr. Jones comes from a county out here close to Washington. He is a pretty wise man if you look at the color of his hair, and I think by the time you get through with him you will think for other reasons he is a wise man, too. I will introduce to you Mr. Jones.

CHAIRMAN J. W. JONES: Fellow Farm Bureau Members and Guests: It, of course, is a pleasure for me to preside over this meeting this afternoon, and particularly a meeting that has as much importance as I believe this one has. I have never seen a program that I thought everyone should be so specifically interested in as the one for this afternoon. It seems to me that we have a program here that should be of interest to every man, woman and child in this audience, and a program that is not only suited for a Farm Bureau convention here in Maryland, but would do very well for a program of national import. The gentlemen who are going to address you this afternoon are men of wide reputation, men who have had great experience, and men who in my opinion are going to bring something to us that is really worthwhile.

I attend a great many farmers' meetings throughout this state, going from one place to another, and it is always my aim to try to get something of importance to take home with me. Frequently we do a lot of talking, and when we get through and sift it all down we find there isn't anything of great importance that we

can make out of the proposition. But I am sure that when we get through with this program this afternoon we are going to have something that will be worthwhile for us to take home, something along the line of finances that we need very badly as agriculturists of this country at the present time, something along the line of marketing that you know we are right in the midst of trying to put into operation; so that I feel this program is the best I have ever seen presented at a Farm Bureau meeting here in Maryland.

It gives me great pleasure to introduce the first speaker, a man of wide reputation, a man who has been a successful livestock producer, has been President of the St. Louis Producers' Association, President of the National Livestock Producers' Association, and was recommended by this organization as a member of the Federal Farm Board, and he is now a member of that board. So I am sure we have no one we could present to you with more interest than Mr. C. B. Denman, who will now address you. (Applause.)

ADDRESS

BY C. B. DENMAN

Washington, D. C.

Mr. Chairman, Folks of the Maryland Agricultural Society: I bring you good wishes that you may have a very interesting and helpful convention. I am happy to join with you in singing, and I am happy to enjoy fellowshop here with you in the convention.

Naturally, you are interested in what I am going to say about the Farm Board, what it is doing to try to help agriculture.

Co-operative marketing in the United States has long been practiced in many localities. It did not, however, assume large proportions or great volume of control until after the World War. Most great economic movements are born of adversity, and during the distress in which

agriculture found itself after war deflation, co-operative marketing, among other things, reflected the farmer's frame of mind in trying to find relief from a condition over which he had little or no control.

Almost parallel with the beginning of this great movement was the enactment of the Capper-Volstead Act, which provided the form or qualifications which agricultural co-operative marketing associations should have. Almost immediately thereafter there sprang up several very large and effective co-operative marketing associations handling such products as dairy, cotton, rice, wool, livestock, fruits and vegetables. While these were in their building there was much legislation and discussion all over this country based upon some form or other of farm relief. All this agitation caused the public generally to believe that the result of the special session of Congress called by President Hoover was the passing of a farm relief law. Perhaps the result in the end may be the same, and I believe it will be much more than that, but the Act which was passed is based upon aiding the farmer in helping himself.

The law which the Federal Farm Board is administering, and concerning which I am to talk with you today, is an Agricultural Marketing Act. It is a great governmental venture into an uncharted field, but has for its purpose the marketing of the agricultural products of this country through farmer-owned and farmer-controlled co-operative associations for the express and implied purpose of bringing stability to the agricultural industry and a more assuring future to farm life. It has not only that as its purpose, but far more than that—the providing of a dependable supply of farm products to the great army of consumers in this country at a fair price.

I think it is very little understood that when Congress passed the Agricultural Marketing Act on June 15, 1929, that co-operative marketing by commodities became a fixed policy of the government of the United States. It not only provided for this policy, but it vested the Fed-

eral Farm Board with rather broad powers and ample funds to make this program effective. What is this policy and whom does it affect? Let me quote you the four provisions of the Act, which indicate the broad scope of activities which the Board is directed to carry out:

1. To minimize speculation.
2. To prevent inefficient and wasteful methods of distribution.
3. To organize producers into effective associations to handle each major product and to finance their activities.
4. To aid in preventing and controlling surpluses of agricultural commodities through a program of orderly production and distribution so as to maintain advantageous domestic markets for the producers of these commodities.

We have for many years heard those with money invested in agricultural lands and production decry the effect that speculation has on the price of farm products, so that if only the first provision were attacked by this Board it would probably be well worthwhile. But I want to give a great deal more time today to discussing with you the second provision—that of preventing inefficient and wasteful methods of distribution of farm products—and the reason why I want to talk with you about this particular provision is that I am speaking today in one of the great eastern cities near the heart of the consuming masses, which, after all, provide the only market we have for agricultural products. It would not matter how economically we produced our products nor how efficiently we operated our co-operative marketing machinery, we still could not find a profit from our operations unless there was someone to furnish us a market and with the ability to buy at a price which would provide that profit. Therefore, the main consideration that we

must give is that we will be able to produce and offer to the housewives of this country a product which will meet their present-day demands and be attractive enough in package form and price that they will want to buy it.

I think I can talk with you about specific things now as regards livestock and livestock products, because I am supposed to more particularly represent these on the Federal Farm Board. Since early in September I have personally shipped from my own feed lots twenty-six carload shipments of cattle, hogs and sheep, totaling more than 1,300 animals. I know exactly what the livestock cost me when they went into my feed lots; I know what it cost to feed and market them; I know exactly what they brought when they reached the market (and I think you will be interested to know that in nearly every instance the consignments topped the market); and on each day when these sales were made I bought from my neighborhood market cuts of meat from the same class of livestock I had sold that day. I am sure you will be interested in the result. On three consecutive weeks I sold fat sheep on the St. Louis market, and in every instance at the top of the market, and on parallel days bought mutton chops, paying more than seven times the price for mutton chops that I received for fat sheep. Despite the fact of efficient handling, the sheep lost money. Undoubtedly there is some wasteful and inefficient distribution going on between my sale as a feeder and my purchase as a consumer. On another day when I topped the St. Louis hog market at $9.40 per cwt., I bought pork chops the same day and made this interesting test: The price of the pork chop cut before it was sliced was 25c per pound; for the slicing alone I paid 10c a pound, or 60c per cwt. more than I got for a live hog that day.

I do not believe until we have an organization which takes in the producer with his money invested in his farm and feeding plant and the processor and the packer who have their money invested in converting that which is a finished product to us but raw material to him, and

permits us to stabilize the price all the way along the line in such a way that that price will be rather well understood, so that we can offer to the housewives packages of meat with grade and price stamped thereon, not only in an attractive package, but at a price which they can afford to pay and will be glad to pay, will we have carried out the provisions under No. 2 of the policies of the Agricultural Marketing Act. Thus it is quite apparent that the consumer's interest is manifest in this legislation. I do not mean to leave the impression that the retailer is dishonest or his profits are excessive, but I do believe that a more economical system can be developed whereby the producer can obtain a more stable price and the consumer have a better article for less money.

Carrying out the provisions under No. 3—to encourage the organization of producers into effective associations or corporations under their own control for greater unity of effort—I am sure that I do not need to urge you to join in your different marketing associations to greater serve your business. The Federal Farm Board *does not propose to buy and sell farm products of any kind whatsoever,* but it does propose, if the producers of each agricultural commodity desire to own and operate their own marketing machinery, to help them in every way possible under the Act to accomplish that purpose, and it further proposes to use its powers and the funds at its command to help finance such an operation.

The need for these co-operative associations, I think, is pretty well understood by the average farmer. A great many farmers, however, have not felt personally the need for joining a co-operative association and putting their production into the marketing organizations. If there are any such farmers in the audience, regardless of how big they are, I want to say to them that by withholding that which they produce from these associations helps just that much to slow up the program and the possibilities for all farmers to benefit by this legislation.

As regards the financing of the co-operatives, I believe it will be entirely possible under the Agricultural Mar-

keting Act to assist in building an adequate rural credits system for American agriculture. Much criticism has ensued from widely-scattered sections concerning the operation of our present rural credits system under the direction of the Federal Intermediate Credit Banks. This criticism, in my opinion, is caused because of the inability of farmers to furnish the capital to finance credit corporations so that they may pyramid their ability to borrow from these Intermediate Credit Banks. The Intermediate Credit Bank service has only been available to the farmers since 1923, and since that time the farmer has been in great financial distress. Now I think that our Board can, through financing of the marketing associations, help them build these credit corporations as subsidiaries to their marketing association, amply financed to take care of the credit needs of all their members and thus finance each of the agricultural commodities.

The mortgage due date has been a great determining factor as to when some commodities go to market, and this explains why many of the markets are glutted at certain seasons of the year. With one county producing almost exclusively one agricultural product, and in which last year the farmers paid an average of more than 17 per cent interest, would indicate that no industry can ever become prosperous if operating under such a handicap. I believe the Agricultural Marketing Act provides a means of breaking bonds like this which have brought distress to many sections.

Can we be helpful, as provided under Section 4, by aiding, preventing and controlling surpluses of any agricultural commodity? I think we can. In fact, I do not believe that any industry can determine a profit from its operations unless it does control both the production and the marketing of its product. We cannot know what consumptive demand is, where it is located, nor when it wants our products until we do control our marketing, and when we do know this we can use that information to tell our farmers what sort of an intelligent produc-

tion program they should embark upon. Certainly there is something wrong with our production program when we have such an experience as we had in 1928, when we sold 49 million hogs for $140,000,000 less than we received for 41 million hogs in 1926. We have too often believed that abundance of production was efficient production, but in the market place we come to a full realization that that theory is wrong. Yet I believe that through control of marketing machinery and in possession of all the facts we can base our production upon consumptive needs in our domestic market and effectually meet that demand with what it wants, and no more, at a price that will be profitable enough to keep the average farmer in business.

Now as to some of the definite activities of the Farm Board since we have been in operation. We have assisted the co-operative marketing associations handling grain to set up the Farmers' National Grain Corporation, which is now beginning to function. The Farm Board proposes to back this co-operative agency and finance a program which will help it to come into control of sufficient facilities across the Grain Belt from Galveston to Duluth to be a real determining factor in the marketing of the grain of this country. It proposes to help it get sufficient volume of business to effectuate this control.

It has helped to set up the National Wool Marketing Corporation which is starting on a similar program and will have the same support by the Board. A national co-operative marketing association for cotton is in course of organization, and a plan has been proposed for livestock. All of these are based on the producers of these commodities coming into the control of their own marketing machinery. A conference has been called for fruits and vegetables about the middle of this month, and it is hoped at that time that rather definite plans will be formulated that we may assist in the marketing of these commodities. Regional dairy marketing associations are bringing their recommendations through the advisory

committee appointed for dairy products to the Farm Board for its consideration.

In administering the Agricultural Marketing Act the Federal Farm Board hopes to use much of the now existing machinery and physical facilities which are employed in the handling of these commodities. It may be necessary to finance the purchase or construction of new elevators and processing plants. No doubt much of the personnel now employed can be utilized. That would be dependent upon the needs as experienced by the co-operatives themselves in the operation of their business. Of this we are sure—that we have an earnest desire to serve agriculture in effectively merchandising its production in an orderly manner so that it can offer to the consuming public that which will meet its demand at a fair price to the great multitude of both classes. We solicit the co-operation and support of the farmers of Maryland and the consumers of Baltimore in this program.

CHAIRMAN JONES: Friends, I am sure I made no mistake when I made the statement that Mr. Denman would give us a very instructive and entertaining talk. Now, if there is anyone who has any real sincere question that they would like to ask Mr. Denman, I am sure he will be glad to answer before he leaves. If there are none, I am sure we all appreciate Mr. Denman's remarks and thank him very much for making the effort he has to come here this afternoon.

Now we will continue with the rest of the program, and I am sure this will be of no less interest to you than that which has gone before.

The gentleman who will next address you is President of the Indiana Farm Bureau Federation, a member of the Board and the Executive Committee of the Farmers' National Grain Corporation. Who could we have at this time that could be of more interest to us as farmers than someone who represents these interests? I therefore take great pleasure in introducing to you at this time Mr. William H. Settle. (Applause.)

ADDRESS

BY W. H. SETTLE

President, Indiana Farm Bureau Federation

Mr. Chairman, Ladies and Gentlemen: I am delighted to be here this afternoon. It turned out that it is almost like a home-coming to me. I met Mr. Cohill, and Mr. Davis, and Mr. Stewart, and a number of others whom I have worked with during these last few years trying to find some solution for this farm problem that we are talking so much about, and it is a real one; it is not solved yet by any means.

I am delighted, as I said, to be here. You know a few years ago when I first came down to Washington and began to discuss the farm problem with some of your Senators and Representatives and even some of you eastern farmers, you couldn't very much agree with me at that time that there was a real farm problem. But I told you then that our interests were mutual, and sooner or later we would be all in the same boat together. At that time there was a tremendous effort being made throughout the entire country to urge and educate our farmers to diversify and go into the dairy business, and this and that and the other in order to find some solution for our ills in the little further western country. We went into the dairy business at that time to some extent, and we have been going in more and more, and now I find even down in Indiana our dairy problem is the biggest one we have got to solve at this time. Our milk is coming this way, and you will soon feel it down here, but not so much as two years hence, when all of these fine Jersey and Holstein and other yearling heifers and calves and two-year-olds begin to produce. Then you farmers down here will realize fully that we have a mutual problem.

What we need in this country, and perhaps we will talk about it a little bit this afternoon, is stabilized agriculture and not so much diversification. We need a bal-

anced program stabilized, so that our corn farmers can produce corn and our wheat farmers can produce wheat, and our tobacco farmers can produce tobacco, and our dairy farmers can produce dairy products. When we get a program of that kind we will begin to find a solution to the farm problem in this country. The way we have been going during the last few years, when we couldn't get enough on our wheat to pay our taxes, or our corn—and we were told to go into something else and we went headlong, and about the time we got into it good we found that that particular industry in agriculture was on the bum. We have just been switching around here. So I think the stabilized agriculture is what we want in this country, and not so much diversification. We will find out where we are eventually.

I am going to do something this afternoon that I seldom do, and that is use a manuscript. I am down here all the way from Indiana and only have forty minutes to talk, so I want to say as much as possible in those few minutes and not repeat anything.

I do not intend to say very much about the Federal Marketing Act, as that has been covered pretty well by Mr. Denman, but I do want to say this, that I find, in going over the country, we have got a lot of folks that seem some way to have the wrong impression about the Federal Marketing Act. If I get it right, and I worked hard and long to get something for the American farmer, what we intend to do through the Federal Marketing Act is to get more money back on the farm to the man who produces the farm commodities. That is the way I understand it.

But we have got a few folks who seem to have the idea that they can jump in now and form a few elevator corporations of one sort or another to try to unload to these farmers something they fear will not be of very much value to them in the future. That is the wrong impression, if I get it right, about what we are trying to do through this Federal Marketing Act.

The agricultural question is very complex and embraces many problems. These problems include social, moral and economic phases. The one most essential to be solved now is the economic problem.

Prosperity, as a rule, brings peace, happiness and contentment to any group or class of society. Where peace and contentment abound you will find a greater social interest, higher ambitions and better morals.

The two subjects which I wish to discuss most today, essential to a solution of our economic ills, are the tariff and marketing or the distribution of farm crops.

Those who have made a study of the present agricultural depression are convinced if farmers are to maintain an equal standard of living with those engaged in other vocations, a new agricultural policy must be established whereby our government will guarantee to us the same protection that we have already given to other groups and industries.

When I speak of protection, I refer to tariffs and legislation that makes it possible through the formation of combinations and trusts to maintain prices much higher than economic conditions warrant. During and since the World War the change from individual and moderate scale business into great combinations and mergers, powerful in influence and price-fixing, has been so great that the entire economic program of agriculture is upset. Thus, we have in this country today the pitiful spectacle of undertaking to apply to agriculture what economists call sound economics against the unsound artificial methods used by practically every other line of business in this country. Most industries have applied what is known as modern business methods, which include large scale business, low overhead, elimination of competition through organization in this country and are protected from world competition by the tariff and sell their goods in this country at the American protected price.

We find the farmer today in an entirely different situation. His prices are governed by world prices and he is forced into competition with the producers of every

land. When an effort is made to secure legislation to give to the farmer the protection that has been written into our laws, we are met with the answer, "It is economically unsound." If a tariff applied to agricultural commodities is unsound, it is also unsound when applied to the commodities of other industries. A tariff written into law and not applied is a mere gesture and of no value to anyone. Herein lies most of the trouble with agriculture—most agricultural tariffs are ineffective because they are not applied. Industrial tariffs are effective because they are applied. The farmer pays the industrial tariffs. He does not collect the agricultural tariffs. Therefore, no equilibrium, no equality for agriculture until a way is formed to apply his tariffs to his industry. Congress is in the process of writing a new tariff law at this time, supposedly to help agriculture. I wonder how many farmers here believe they would be benefited by the tariff bill as it came from the House. I wish I had the time to discuss it, but I have not. I will mention just one or two of the jokers in the bill that is intended to be an agricultural relief tariff bill.

First is the imposition of duties on cement, brick, shingles and lumber that are now on the free list, which will greatly increase the building and maintaining of our homes. Also the tariffs on practically everything used in the home, by the wife and family, have been increased.

The tariff on hides is more than offset by the tariff on shoes. There are 40 paragraphs of changes in the farm tariffs and 1,000 paragraphs of changes in industrial tariffs.

The tariff increase on beef, dairy and poultry products and wool will help, providing these articles are placed on the market intelligently through co-operative marketing associations. Otherwise farmers will not receive much of the benefits that will be derived by these tariffs.

When we consider corn, flax, pork, lard and all kinds of fats produced in this country, we must place the tariff on the commodities that are competing and driving our products out of the home market. I refer to cocoanut

oil coming in from the Philippines and vegetable oils from foreign countries.

This cocoanut oil is pretty rough on the business of the American farmer. Bringing 575,000,000 pounds of it into the country simply takes away the market from 575,000,000 pounds of oils and fats produced on American farms, or almost ten per cent of all the farm oils and fats in the United States. The native who harvests cocoanuts in the jungles of Luzon is thus a considerable factor in holding down prices of hogs in the Middle West, of soybeans in Illinois and North Carolina, of cotton and peanuts in the South, of flax in the Northwest, and of dairy products all over the United States. At least 75 per cent of all the farmers in the nation are affected in a substantial way by this form of competition.

But this is not all. The Philippine cocoanut industry is expanding at a tremendous rate. Prices for oil that would send the American producer of hogs, butter and cottonseed to the poorhouse are very satisfactory indeed to the little brown Malay, whose grandpa carried a spear and hunted heads in the hills back of Manila, and so more cocoanut trees are planted every year. Within five years the Philippine cocoanut oil production will be above 1,600,000,000 pounds and above 2,000,000,000 pounds in 1939. Unless something is done to stop this flood of oil, it will be good-night to the American standard of living on the farm.

What is the remedy? The Tariff? Exactly. However, the Philippines are the key to this whole problem, for there is no use putting a tariff on vegetable oil unless it is applied to oil coming from the Philippines as well as to oil produced in foreign countries. Don't let that outstanding fact escape you in any discussion of making the tariff serve agriculture, for it is the most important single point in the entire range of the farm tariff situation. Every farmer should inform himself on this important question, our tariff policy, and how it can be applied to agriculture, will determine largely the future for American farmers.

Organization, Education, Taxation, Legislation and Transportation are the five great problems to be solved if agriculture is to maintain its proper place side by side with the other great industries that have progressed so rapidly in recent years.

Organization is the first step essential to successful and profitable farming. It is useless for us to even attempt as individuals to compete with organized industry, organized labor and organized finance, and unless we are willing to take the first step we cannot hope to deal with the other four problems successfully.

The orderly distribution of farm commodities, under any Farm Relief plan, is our greatest problem. This cannot be accomplished except through the organization of large scale co-operative associations.

If farmers and agricultural educational institutions had in the past devoted the same effort to distribution or marketing that has been devoted to production, we would not be in the deplorable condition we find ourselves in today. There is just one way out, and one only, that is through organization. Unless the problems mentioned above are solved through organized effort they will never be solved, and agriculture will pursue the natural course of all individual effort in an organized country.

The country has not yet grasped the full significance of a decaying agricultural industry. The future of America depends largely on the results of the next few years. The statement is often made that the farmers are the backbone of the country, that agriculture is the basic industry, and that general prosperity will not long continue unless the basic industry is in a healthy condition. I believe this statement is true, and I do not believe there is general prosperity at this time. Although a few industries are exceedingly prosperous, the great masses of the people, especially the rural people, are very much depressed and far from being prosperous.

The tremendous effort that has been made in recent years by farm organizations for equality for agriculture has not been in vain. Although we do not see the results

we desire, we are nearer the goal than ever before. Farm organizations have forced the agricultural question into limelight. Men of all occupations are studying it, and if farmers will rally to the support of their organizations and refuse to raise the white flag, a sound agricultural policy will be secured within the next few years. We have made a start in the right direction. Experience in practice will soon prove to those who are charged with the responsibility that our contentions were right and our judgment is sound on the agricultural question.

The Federal Farm Board is tackling this problem through co-operative marketing associations and the establishment of a central selling agency.

The National Grain Corporation

> The Farmers' National Grain Corporation provides a plan whereby farmers may extend their co-operative grain marketing activities on an extensive scale into the domestic terminal and export markets. The plan * * * is the result of conscientious effort on the part of a committee representing all types of existing farmer-owned grain marketing agencies. Great pains have been taken to insure that the provisions are essentially fair to all types of grain marketing associations. Best of all, it provides a means whereby the grain producers may help themselves through their own efforts rather than by receiving what might be termed a direct "dole" out of public funds. With these provisions the new corporation has a splendid opportunity for accomplishing worthwhile results for grain producers and should receive the full support of all existing farmer-owned and farmer-controlled grain marketing associations.

First, who may become stockholders, and upon what basis? Since it is impractical, if not impossible, to deal with all of the individuals or small units; and since a co-operative organization of real strength can only be

built by successive steps from the bottom upward, it is provided that stock may only be held by central organizations representing such groups of units and individuals. These may be Farmers' Elevator Associations, Terminal sales agencies or grain pools. No matter what the type, so they are genuinely co-operative, they may purchase stock. Such purchase makes available to all of their members, through these central organizations, every advantage which the corporation offers. The rate at which the stock is to be subscribed is one cent per bushel for the average amount handled each year for the past three years. Thus, if the average has been five million bushels, the subscription will be for $50,000. In the case of a new co-operative, or one less than three years old, the Directors of the Corporation may determine a fair basis. Ten per cent of such stock subscription must be paid in cash and the rest in five equal amounts over the next five years. Notes are required for the deferred amounts, at four per cent interest, and these may be collateralized by the certificate of stock.

Second, how will marketing be done? The co-operatives will bring the grain to the National Grain Corporation at the usual or natural market centers, dealing with their members in their own chosen way. Branch offices of the Corporation will be maintained at all principal markets for receiving the grain from the co-operatives, but the central organization, with an accurate knowledge of crop and market conditions throughout the world, will hereafter direct the marketing. So that the humblest farmer in the remotest area, if he be a member of a co-operative connecting through, has for his own use and in relation to his bushels, few or many, as effective a means for securing the final possible cent of price as though he were a skilled operator in the markets, having a vast volume of grain, owning adequate facilities for cleaning, grading, mixing or storing, and with adequate finance for carrying the grain when it would seem advisable to do so in order to secure best results. These are advantages of which we have dreamed and toward which

we have striven. They are now ours for the taking. The Farmers' National Grain Corporation will command every marketing advantage named, and through his own organization will return to the grower the results of such marketing, less only the necessary costs. The co-operative will function as now in every matter except that of sale, which will be consolidated in the hands of the central agency for effectiveness. This provides centralized, controlled, intelligent bargaining, using our present machinery so far as it reaches, and extending co-operative effort into the final market, and that powerfully.

How will loans be made? Through the same channels as grain moves to market, loans will go back. The Farm Board makes the funds available to the Grain Corporation, which in turn lends to its stockholder (the farmers' elevator association or terminal sales agency or grain pool) for the use of its members.

Facility loans must be on secure basis, of course. Blanks are being prepared for these loans and effort will be made to extend the utmost help possible. Nevertheless it should be kept in mind that we should first help ourselves to the maximum of our abilities, in order that funds may be available for that which we cannot do ourselves. I would urge, in applying for facility loans, to provide at least 50 per cent of the total cost or value of the facilities themselves, if possible. It will make a sounder, more stable organization; and it will enable a larger part of the total need for facilities to be met.

Some dangers and risks are involved in the whole program now being projected, and we need not ignore them. We need rather to face them. There is the danger that we may give the public and our own people the false impression that the farm problem is now settled, that the farmer has come into his own or is about to do so. Such a result would be most unhappy. The problem is far from being solved. The recent report of the Secretary of Agriculture gives little ground for declaring that the farmer's condition is even substantially improved, much less cured. A net loss of 600,000 persons in the farm

population for 1928 is not reassuring. The net farm income for the crop season 1928-29 increased over the previous year by about two dollars and a nickle per farm family, which hardly meets the farm problem.

It would be nothing less than bad faith for us to stop short of giving the present plan a full and honest chance to demonstrate its own effectiveness, backed by the heartiest co-operation of which our organizations are capable. And if when we have done so it is shown that although some help has been secured, the elemental source of our difficulty has not been reached, I have faith that Congress and the American people will see that agriculture gets the remaining necessary thing to provide its security.

There is some danger that we may become enmeshed in the net of political administration. Agriculture needs the friendly help of governmental agencies, but the farmer has no desire to become a mere ward of the government.

The future of American agriculture depends on the willingness of our farmers to co-operate through organized effort. Our economic condition will determine the future of the rural home, the rural school and the rural church. These institutions will determine to a great degree what the future of America will be.

I hope farm organizations will continue and grow, giving their support to every co-operative effort to control and stabilize agricultural commodities, both in production and marketing, and will continue to stand for equality for agriculture, equality of opportunity, equal benefits through our tariff policy, equal opportunities of education for our children, an equitable distribution of taxes according to ability to pay so that our good wives, sons and daughters may be able to enjoy some of the pleasures and blessings of life and remain on these farms of ours.

Everyone that has spoken on the agricultural question recently and during the last campaign has stated that the farm problem is the greatest economic problem awaiting a solution by our government. In my opinion it em-

braces more than an economic problem—a great moral question which depends very largely on an educated, contented and prosperous rural population.

We are now the oldest Democratic form of government in the world; a government of the people, by the people and for the people. Ours is the greatest government in the world. The American farmer has contributed largely in making this government what it is today. It is our duty to carry on and protect the greatest material heritage that God has given to man—*the soil.*

In closing I wish to make this statement. Political parties and governments come and go. Policies come and go. But man is greater than governments and greater than constitutions. Within the soul of man is that which endures throughout the ages.

In this great country we have means of material wealth which rightfully belong to us. Among the races that make up the population of this great country, each has the best that is in him to give—people who look beyond the place where the roads go down.

In spite of wars, in spite of misunderstandings, the spirit of peace and brotherly love is growing with the years.

It has become known to all men, unity is strength and through co-operation and co-ordination of effort in an organization, such as ours inevitably will come peace, happiness and prosperity.

CHAIRMAN JONES: I am sure a great many of you have heard what you have been anxious to hear. Are there any questions? I believe that concludes our program for this afternoon.

THURSDAY EVENING

January 9, 1930

The Annual Banquet convened at six-thirty o'clock. At eight-fifteen President Davis introduced Dr. T. B. Symons as Toastmaster.

TOASTMASTER SYMONS: I am sure we are all greatly pleased with the entertainment by the quartette from the Eastern Shore.

I feel sure that all of us this evening feel greatly honored by the presence of the Chief Executive of this State. In riding up to Philadelphia the other day we stopped at Chester, and as I looked out of the window for a moment I saw a sign, "What Chester makes makes Chester." I thought that was a wonderful slogan, and applied to our state would be very appropriate, "What Maryland makes makes Maryland." It certainly can be said of her Governor, Albert C. Ritchie. (Applause.)

I want to say, friends, that Governor Ritchie has been a real friend to agriculture in the State of Maryland, and aside from his personal interest in the industry, he has done many things that meant not only thousands of dollars to the interests of our state, but demonstrated the appreciation on the part of the administration that was pleasing to all of us. It has only been a short time ago when it was necessary to appeal to our President, Dr. R. A. Pearson, and through him to His Excellency, Governor Ritchie, and we were able this past year to prevent the Federal quarantine being extended over this state for the Japanese beetle, a matter that has meant thousands of dollars to the State of Maryland in the last two years, and it was the sympathetic attitude and the helpfulness that Governor Ritchie extended that has enabled us to bring about this result in co-operation with the Washington Administration.

So, my friends, I could go on and relate the many things that Governor Ritchie has done for agriculture, but I will stop by saying that Governor Ritchie has been, in my opinion, one of the greatest Governors for the agricultural industry that the State has ever enjoyed (Applause.) I take great pleasure in presenting His Excellency, Governor Albert C. Ritchie.

HON. ALBERT C. RITCHIE: Mr. Toastmaster, Ladies and Gentlemen:

I am always pleased to attend these annual meetings,

and any meetings of this organization, and I congratulate, or rather I join in the congratulations which have been extended to Mr. Davis tonight upon his capable leadership of this body. I am told that he is now serving his fifth term, and it makes four terms look right inadequate and trivial! (Laughter and applause.)

I very much appreciate the Doctor's generous reference to me in connection with agriculture. It is hardly deserved. If any part of it is deserved, it is because I recognize that I am not a farmer and do not want to be a political farmer. It seems to me that politicians who are not but who endeavor to be farmers are apt to contribute more heat than light to the situation, and any good fortune which has come to me in connection with the agricultural work of my administration, or in connection with agricultural legislation, has been entirely due, I am glad to say, to the fact that I have recognized that it is not necessary for me to prescribe remedies, but that I have tried to secure or keep in the state service those men and those women who are thoroughly competent to advise and to administer along those lines; having gotten them, or having kept them, in the state service, I have had what I think is sense enough to turn the job over to them and to let them do it as best they can, without any supervision from me.

So, gentlemen, I think that the very favorable situation which we have in this state, both in legislative matters and agricultural college activities, are entirely due to capable men and women who administer that college.

One thing has been started; another thing has had its real beginnings today which I am very much in hopes will result in real benefit to the agricultural section of our community in all its branches. We have been laying the plans for it for quite a little while, but they are just coming to a head. It is a survey which is being conducted primarily by the Baltimore Association of Commerce with the financial aid of the state government, the co-operation of myself and the appropriate department

heads—a survey which is being made of the natural resources of the State of Maryland. The object is to collect and compile all the facts which will give us the economic position which Maryland occupies in the nation commercially, industrially, and agriculturally, and then build on that foundation, build on that basis some constructive plan for developing those resources which have never been developed, and for bringing to greater and higher utility those resources which are now being developed.

That survey is going to include pretty nearly everything we have—seafood industry, water power, labor, industry of all kinds, and it is going particularly to include, of course, agriculture and the farmers' problems of all kinds.

I expect that Maryland's greatest asset is her geographical location. We are situated close to the great market centers of the east, indeed, of the middle west, so that transportation hauls are short and water transportation affords in many instances still cheaper means for bringing raw material and other products to us. Our soil, as you know better than I do, and our climatic conditions are favorable to agriculture.

So that we have many natural advantages which ought to put us in a favorable position for competition. And yet, here in Maryland, just as in other eastern states, we see the great State of New York and other states in our immediate section going all the way to California, 3,000 miles, away over on the Pacific Ocean, on the other side of our continent, for fruits, vegetables, poultry, eggs, and what not, and we see the same thing occur by the same great markets in the east going to the middle west and far west for beef cattle, for hogs, and for sheep.

There doesn't seem to be any adequate reason why Maryland farms and other farms in the east shouldn't be producing those things ourselves instead of letting it go west, and let the far west come into our markets and pre-empt them for us.

There is room, therefore, it seems to me, for an extensive and intensive development of agriculture in this state in all its branches. It might mean, if properly done, greater farm acreage, greater farm population, larger and better production, and happily, I hope, great profit for the farmer.

The only difficulty about it, the one way to hope for a remedy, is to assemble the facts, all the essentials, all the fundamentals about the natural resources.

In one other respect the farmer needs help, but there isn't anything for him to do but help himself. I like any farm meeting, because this is so obvious, and yet it is so difficult to get upon it and emphasize it for a moment —everybody knows the changed conditions of our rural life, that the automobile, good roads, telephones, radios, and other modern conditions have brought about. The farmer is no longer isolated as he was a generation ago, perhaps. The rural farming community is not self-sustaining any longer. The farmer is an integral part of the whole population of our country, and the rural community is an inseparable part of our whole national economic life.

Under those circumstances and those conditions it is perfectly impossible for the individual farmer ever to compete in the struggle for life and a living and for existence. The only way that the farmer can compete under those new conditions is to assemble, to co-operate, to co-ordinate, and to organize. You have got a whole lot of good co-operative work already going on in this state. You see in the milk industry, in the tobacco industry, and in other farming industries co-operation, too, but a lot of it is not organized as well as it ought to be organized, and a lot of it is not organized.

As we look around at the conditions of our nation, we find that finance is thoroughly organized for its own benefit, that industry is thoroughly organized for its own benefit, and that labor is thoroughly organized for its own benefit. All of that is as it should be, but the financial organization, and the industrial organization, and

the labor organizations are not primarily concerned with the needs and necessities of the farmer, and it is perfectly impossible in this changed and changing world for the farmer to get what is his due and what ought to be coming if every other activity of life is thoroughly organized and equipped and the agricultural interests alone are not. There isn't any way to compete with those other organizations trying to get what they think they deserve except by an organized agricultural association endeavoring to get the things it deserves.

There happens to be at the present moment a very practical inducement for farmers to organize in the cooperatives and other like associations, and that, of course, is the Federal Farm Board, which the National Government has recently inaugurated, which, as you know, lends money to finance the farmer in the orderly marketing of his crops and relieves him of the necessity of dumping them on the market when the market is not ready to assimilate them, to absorb them, and to take care of them. The Federal Farm Board does not lend any of its millions of dollars to a single individual farmer. It lends its money only to organized farmers' associations, cooperatives, doing business upon a sound and a substantial basis. So that for the farm producers of Maryland, in order to get the benefit of that, we have got to organize into associations in the way that the law provides.

It seems to me, gentlemen, that if Maryland farmers will but realize that situation and do for themselves what other lines of activity are doing for themselves, then the farmer will be in a position not only to meet the changed and changing economic conditions of the present, but to look to the future with assurance, with confidence, and with success! (Applause.)

. . . Address by Robert Arthur Elwood . . .

ADJOURNMENT

FRIDAY MORNING

January 10, 1930

The Third Session convened at nine-forty-five o'clock, President Davis presiding.

PRESIDENT DAVIS: The meeting will come to order. We are going to hear from Dr. R. A. Pearson, President of the University of Maryland. (Applause.)

ADDRESS

BY DR. R. A. PEARSON

University of Maryland

First, let me thank you for the very kind and encouraging message that came through your Secretary to me a year ago when I was lying flat on my back in the hospital, and some of my closest friends thought I would never come back to health and strength again. That beautiful message was really an inspiration, and I appreciate it very much.

Now we have come to the morning after, and the faithful rear guard is here. The rear guard of an army is a part of the army of very great importance, as everyone knows who is familiar with army tactics. By common consent, Mr. Davis, this is the best meeting ever held by the Maryland Farm Bureau Federation. I hear it on all sides. Perhaps meeting in this wonderful hotel has had its effect upon the spirit of those who came. Undoubtedly, confidence in the officers of the Association has had its effect, and I would like to congratulate them upon the way they are attending to their duties as officers of this Association. I congratulate the President and the Vice-President, and I congratulate the Secretary. I think it quite remarkable the way the details of all these meetings have been worked out, and so far as I have noticed there has been no difficulty and no conflict. Perhaps other reasons occur to you as to why this has been the most successful meeting.

I think we all agree that one important reason is that there now sits in Washington at the seat of our Government a Federal Farm Board. Somehow or other that has put new confidence and new hope into the hearts of farming people everywhere. We have been coming together year after year and wanting something to be done, and nothing was done. It sometimes seems as though we asked our National Congress for bread and they gave us a stone. But now we have put up this Farm Board, and it actually is functioning, and great things are expected from it, and I don't believe that we are pinning our hopes on anything that is false.

It is my great pleasure to know, personally, every member of the Farm Board. Some are more able men than others, perhaps, but I don't believe that there is a black sheep in the lot. I don't believe there is a yellow streak in any of them. I believe that every one of those men is honestly and devotedly trying to do something for this great fundamental industry, in order that it may be put upon a parity with the other great industries of the country. That is what we want. We have not asked for any special favors at any time. We have just asked that agriculture be put on a level with other great activities.

And now, so far as we know, the Government has done all that it can do for the time being to bring this about. So that has put new confidence and new hope in the farmers of Maryland, and they have shown it by their great attendance and their fine response at this meeting. Let me tell you that all those little tin whistles and flubdubs we had in this room last night and made such a jolly noise would have been pretty flat accessories to a banquet if it hadn't reflected good feeling in the hearts of the people who are here. What a fine time we did have with our jolly Toastmaster, and then the comebacks which some of the speakers gave! I have a good one, too, but I am not going to bring it to him now. I will give it to him in private, perhaps, or wait until I get a

great, big audience that fills the room, and then I will bring it out, perhaps.

Well, what next? Some of the great leaders of agriculture are already talking about a get-together to help map out the next look-forward. Why, we are not going to be content just to have the financial part of our industry taken care of as well as the Government can do it! Some of these great leaders are looking deeply into the question, and they are thinking of agriculture in the past, and in the present, and in the future, and they are anxious that the farmers of this nation shall retain for all time to come their position of pre-eminence. They want the farms of this country to continue to be the source, the place from which great leaders of our nation shall come after having had a training that can be given to boys and girls of no other place so well as on a farm.

I have just been reading a biography of Myron T. Herrick, who, except for a very trifling accident, undoubtedly would have been President of the United States, in my opinion, anyhow, and the opinion of many others, and he places great emphasis upon his boyhood on the farm, how it made him resourceful, and how it helped him in later years to meet kings and great magnates, and conduct affairs of the utmost national importance successfully—training on the farm. As things stand now, we sometimes wonder if that type of boy is attracted to farm life as he once was, and as we in this room all hope that he always will be attracted. That is a great question.

Of course, we have got to give attention to this financial matter; we have got to eat, have got to have clothes to wear, we have got to have some pleasure time. And then on the collateral question, how are we going to use it, how about the social life in the country, how about the relationship between your urban and suburban and rural people and all those questions? Some states have already taken formal notice of this and are conducting carefully planned studies. The State of Vermont is one. Their Rural Life Commission is issuing reports of a good

deal of interest. We are going to learn more as our work proceeds, and as our work proceeds in other directions.

But isn't it rather inspiring to think that agriculture is on the upgrade again, and that people are planning upon its 100 per cent rehabilitation in our nation. In what I say I do not overlook the wonderful farm homes we have now, and the wonderful people on the farms. I am not speaking of your home, of your community; I am speaking of agriculture from a national standpoint, and I am just mentioning things that are well known to all of you.

There are three prys, or levers, shall I say, that farmers may use to help to lift themselves onto a higher level, just three. There is legislation, and there is co-operation, and there is education. I wonder if we want more legislation than we have now except for perhaps some little details that have to be arranged. The other day in Washington I heard one of the most influential men in our nation say that he believed that the farmers of this country can have from Congress literally, this is what he said, "any legislation that they want and that is asked for by the American Farm Bureau Federation, the National Grange, the Farmers' Union, the United States Department of Agriculture, and the agricultural colleges." Just think of that! Why, those institutions have been united a good many times in the past, and they didn't get it, and now we are told by this man of great influence and insight that the farmers can have it, and Congress has shown its willingness to produce the legislation.

At the State Grange meeting in Westminster a few weeks ago Congressman Ketchum stood there and said, "I am willing to pledge Congress will pro-rate another Hundred Million or Two Hundred Million Dollars if it is necessary to make these things go which we have started out to accomplish.

And then co-operation: Why, friends, we are in the beginning of a co-operative era. It is going to make some

of us dizzy as we see it go by unless we get into line and move along with the progress of events. I don't know whether we will ever be 100 per cent perfect on co-operation. The only instance of 100 per cent perfection I ever heard of was related recently of a man who lived in Philadelphia. He was an officer of a telegraph company, and he was always very punctual in coming home in the evening, as punctual as he was in leaving in the morning for his work. He lived in the suburbs.

One night he did not get home. His wife was anxious. She waited for the next train, and the next, and the next, and he did not get home. She was almost frantic. She began to call up his office associates in the city, but she couldn't locate any of them. Then finally, being the wife of a telegraph officer, and having a frank for sending messages without cost, she sent ten telegrams to ten of his closest friends and said, "Charles has not returned home tonight, and I am greatly distressed. Do you know anything about him?"

Then she waited for the replies. About a quarter of twelve Charles arrived, and as he turned in to the gate of their little home he saw a telegraph boy with his hands full of messages. He said, "What have you got there?"

The boy said, "I have got some messages for your wife."

He said, "Let me see them." He walked into the house, and his wife greeted him with great joy. They opened the ten messages that came from these ten friends of his, and every message read exactly the same, saying, "Do not worry. Charles is spending the night with me!" (Laughter.) I call that co-operation, 100 per cent, and we may not get that far.

The one great thing about the McNary-Haugen Bill that I liked was that it was going to compel 100 per cent co-operation. Every person had to get into it whether he wanted to or not. But perhaps it was not best; I presume it was not best. I presume it might have led to a reaction, perhaps a revolt on the part of some of

our own friends, the independent farmers of this nation. But, friends, with the great funds that the Federal Farm Board has at hand, and the charge that it shall deal through co-operative societies, we can imagine the advance that is going to be made along these lines.

That leaves a third lever, for a few moments of my time and yours, and that is education. Don't think for a moment I think everyone has to go through college to succeed. I know as well as you that some of the most successful of people did not go to college. I sometimes wonder how much more successful they might have been if they had gone to college. Some would have been and some would have not, without a doubt.

Someone has defined education as that which remains with you after you have forgotten what you learned in school and in college. Perhaps that is not such a bad definition of education. Well, in every state, thanks to the foresight of Abraham Lincoln and of Senator Morrow, there is one institution founded on a national charter adopted by the state where consideration is given to agriculture, and you know your College of Agriculture and your Agricultural Experiment Station at College Park, and you know the distinguished Director of that work, and you know the distinguished leader of our extension work, whose duty it is to take out in every nook and corner of the state, to those people who cannot come to College Park, the things that are worked out and checked up and approved in the Experiment Station and that are being taught in the classrooms of the College.

I was asked to bring you greetings from the University of Maryland, and I will just close by telling you that this great institution at College Park is an essential part of the agricultural system of Maryland, just as essential as is the great research laboratory conducted by the DuPont Company up in Wilmington, a laboratory that takes graduates of many of the universities of the country for service of that industry.

Agriculture is not made up of a few million or multi-million dollar plants, it is made up on the contrary of

many, many thousands of plants of small capital, comparatively small capital, and it is good for the nation that it is so. I hope it always will be so, and this nation, as other nations, has seen that it has a duty, a special duty, towards these units that make up its greatest industry, and for that reason the agriculture college and experiment station and extension work have been established.

It is our great desire to play our part in this agricultural picture that is being painted in the State of Maryland, just as it is your part, and yours, and yours, each one having something to do in that picture.

My friends, my great wish is that the folks who are not here this morning could appreciate the importance of agriculture. Too many of them think that an appropriation for an agricultural experiment station is in a direct interest of the farmer. It is in his interest, but far less to his interest than it is to the interest of the food consumers, and the same will apply to all types of agricultural work, and that is the reason why it is fair and right for this kind of work to be supported by taxes paid by all of the people.

Why folks, it gives me a thrill to feel that I have some connection with this great fundamental industry, which moves slowly, which is manned by careful, conservative people who must require that the thing shall be proven to them, particularly before they adopt it. I have a special pride in being connected in a small way with such a great industry, and I find that I feel a thrill as I believe you do when I look forward into the future, and I can see that the improvements that have begun now are only the forerunners of other improvements that are to follow.

What does it all mean? It means we must keep our Farm Bureau Federation strong; we must get those neighbors into it. We must stand by the Grange. We must be friendly with agricultural organizations, because, as the Governor so well said last night—I was greatly pleased by his remarks—every other kind of activity is organized. Farmers must follow that example,

or they will suffer the penalty. So I want to congratulate you upon this meeting. I bring you cordial, friendly greetings from the University, and pledge you that our great interest all the time is to serve you, and serve agriculture in the State of Maryland better and better! (Applause.)

PRESIDENT DAVIS: We all enjoyed Dr. Pearson's address very much. I know we all felt that we were in trouble last winter and spring when we knew that he was in poor health, and it has given us the greatest pleasure this morning to have him back with us, because we have always felt that he wasn't over there in the University in a high position and belonged to some interest that was opposed to us, or not sympathetic to us, but as farmers, we have all felt that Dr. Pearson just belonged to us. It gives us all extreme pleasure this morning to know that we have him back with us in health, and I know he is sure to go forward to a greater attainment than ever in the past. We have always looked to Dr. Pearson to guide us, and I am sure we are all glad to hear his kind words this morning.

Now I would like to introduce to you just for a few words, Mr. Bonham, Director of Events of this hotel. I would just like him to say a few words to you before he leaves to attend a very sad event. As you know, we lost the President of this hotel in the last few days, and while the service of the hotel here has gone forward without any trouble and has just been at the very best, we have all felt that to a certain extent we were under the shadow of this loss that the hotel folks have suffered. Mr. Bonham. (Applause.)

MR. BONHAM: Mr. President, Ladies and Gentlemen: It is a great pleasure indeed to greet you on behalf of the Hotel, although it is rather sad to me to feel that I have to be pinch-hitting, because under other circumstances Mr. Busick, the President of this hotel, would have greeted you here today. We lost him, as Mr. Davis has told you, and as you know from the press, during the time of your convention here.

I think, however, the impress of his personality couldn't have been more clearly shown than it has been in the way the organization of the hotel has functioned since that time, because, as you can all understand, it was a tremendous shock to everyone in the hotel, and naturally, a thing calculated to badly upset an organization. His policy, however, has always been, as those of you who knew him intimately know, that you must carry on, the thing must go forward. He would never, during his lifetime, and his associates here with us, would never permit any lagging or letting down, regardless of how serious a matter happened, and the word passed around the hotel within an hour after we had learned of his untimely death, that everybody must function normally, and that there must be no upset. I don't know, of course, we couldn't have a complete check, but the feeling we had was that under those circumstances the organization had continued to function at least fairly well.

I hope very sincerely that that is true. Our system calls for unobtrusive service. We have tried, during the time you ladies and gentlemen have been here, to be constantly at your service, and give you every service that you could want or desire, but not to run over you, not to obtrude that service on you to a point where it would be offensive. If we failed in any respect at all, we are all of us very sorry indeed, because it has been a great delight to have you here with us, and it will be a great pleasure indeed if we can be fortunate enough to have you with us again. Thank you! (Applause.)

PRESIDENT DAVIS: If Mr. Cohill is in the room I would like to have him step up here on the platform. (Applause.) Of course you folks all know Mr. Cohill. He doesn't need any introduction. I just felt that this session wouldn't be complete unless Mr. Cohill had a part in it. I believe we have never had an annual meeting since he resigned from the Presidency that he hasn't had some part in the meeting, and I feel that this was the time, and we could finish this thing up in the proper way by having Mr. Cohill preside over this closing ses-

sion. I am not going to make any extended introduction, because he doesn't need it.

CHAIRMAN COHILL: Fellow Farmers: This is, I think, about the 29th or 30th time—Dr. Symons can tell you better than I can—that I have been present at meetings of the farmers of Maryland. Our first meeting was down in Maltby House. That's gone. Then next up in Duchene Hall, and that's gone. Then up in the old Eutaw House, and that's gone. Nearly all the old members are gone. There are only two or three of us left that were members of the old body. I think we called it the Horticultural Society then. That has been a good while ago.

I take great pleasure in presiding over your meeting this morning at your President's request. I believe in co-operation. That reminds me of three or four weeks ago a neighbor of ours was getting up a big bridge party. Her husband killed a couple of turkeys, and they were going to have a big time. Mrs. Cohill and I were not invited, but about ten minutes before the dinner she called over and told us two of her friends had disappointed her at the last moment, and she wanted to know if we couldn't come over and take their places, and we did. That is a little bit of co-operation, you see! (Laughter.)

About ten minutes ago Mr. Davis called over and wanted to know if I wouldn't come up and preside over this meeting. I am certainly glad to do it.

The next thing in order is the report of the Credentials Committee. Mr. Cockey.

(Mr. Cockey presented the prepared report of the Credentials Committee.)

REPORT OF CREDENTIALS COMMITTEE

Your Credentials Committee has examined the records submitted by the Secretary-Treasurer of the Maryland Agricultural Society-The Maryland Farm Bureau Federation and find the following county and affiliated organizations in good standing and recommend in addition to their duly authorized director the seating of delegates as follows:

FOR THE COUNTIES

County	Number Members Paid	Director	Delegates	Total
Anne Arundel	107	1	2	3
Baltimore	208	1	4	5
Carroll	45	1	1	2
Caroline	147	1	3	4
Frederick	328	1	7	8
Dorchester	61	1	1	2
Harford	295	1	6	7
Howard	173	1	3	4
Kent	247	1	5	6
Montgomery	179	1	4	5
Queen Annes	197	1	4	5
Talbot	154	1	3	4
Washington	83	1	2	3
Worcester	132	1	3	4
Total	2356	14	48	62

FOR THE AFFILIATED ORGANIZATIONS

	Director	Delegates	Total
Md. Stockmen's Association	1	1	2
Md. Beekeepers' Association	1	1	2
Md. Crop Improvement Assn.	1	1	2
Md. Vegetable Growers' Assn.	1	1	2
Md. Poultry Assn.	1	1	2
Md. Tobacco Growers' Assn.	1	3	4
Md. State Dairymen's Assn.	1	3	4
Agricultural Corp. of Md.	1	3	4
Md. State Horticultural Society	1	1	2
Total	9	15	24

This will make the Convention consist of 62 delegates from the Counties and 24 from the Federated organizations, or a total of 86 delegates, entitled to vote. In addition to this, the President and Vice-President and the Chairman of the Home and Community Committee of the State Farm Bureau Federation are entitled to vote.

Respectfully submitted,

CHARLES T. COCKEY, JR., Chairman,
RICHARD BLACKBURN,
W. FRANK HOLTER,
C. ASHBY DUVALL,
C. S. CHESSER.

MR. COCKEY: I move the adoption of this report.

(The motion was duty seconded and carried.)

CHAIRMAN COHILL: There are no amendments to the Constitution.

The Auditing Committee is next in order.

SECRETARY STEWART: Mr. Chairman, there is no Auditing Committee appointed. I read at the first day's session from my own annual report as Secretary-Treasurer from the auditor's report of our books. I just sent down for a copy of it to be brought up here. You can have it read again and accept the audit of the public accountant who went over the books and made the audit for us.

CHAIRMAN COHILL: What is your pleasure? Shall we have the report brought up and read? It is the report of a public accountant, and was read at the first session.

MR. COCKEY: Mr. Chairman, in view of the fact that this report has already been read before the convention, I move that we consider it as read here this morning.

. . . The motion was duly seconded and carried . . .

CHAIRMAN COHILL: Is Dr. Patterson in the room? He has been on this job about as long as I have, I think. Dr. Patterson doesn't need any introduction to this audience. (Applause.)

ADDRESS

BY DR. H. J. PATTERSON

University of Maryland

Mr. Chairman, Ladies and Gentlemen: It is always a pleasure for me to meet with you. I like to hear what you have to say, learn what you are thinking about, but I do not enjoy talking to audiences very greatly, and I will endeavor to make what I have to say this morning as brief as possible. But I do think it is due you to have me give you some little picture of the Experiment Station work.

The Experiment Station is an institution designed to solve the problem of the farmer, and we all know that we have a great many problems. I first want to congratulate the officers and the Association, the Farm Bu-

reau, on the success of these meetings. You have had a wonderful response in attendance, and the programs have been fine and well carried out. It has been a great pleasure for me to drop into almost all of the meetings for a part of the session and to hear the fine type of discussion that was taking place. I am sure that all of you who have attended these meetings will go home feeling that your time has been profitably spent, and that it has been full of pleasure for you.

The investigation that we have in progress at the Experiment Station has been planned and inaugurated to solve your farm problems, and they have come to us either from individual farmers or groups of farmers, and I want to say here that I want every farmer and every group and every organization of farmers to feel that the Experiment Station is their institution, and that if you have problems, make your problems known, and we will endeavor to give you as much help as our facilities will permit.

The Experiment Station in Maryland came into existence in 1887 by the passage of the Federal Act, and the Experiment Station is supported by the Federal Government and the State. We now have an annual appropriation of $90,000 from the Federal Government and $74,000 from the state for conducting agricultural research. The work we have in progress now is under the auspices of eleven different departments, and these departments touch almost every phase of work on the farms and in the farm home. The whole object of the work might be summed up in the desire to make agriculture more profitable, to make life on the farm and rural life more complete and satisfying.

The departments of research which we maintain may be classified as follows, and I am going to take your time so you will know the great scope of our work.

1. Agricultural economics.
2. Agricultural engineering.
3. Agronomy, divided into soils and crops.
4. Animal husbandry.

5. Bacteriology and animal pathology.
6. Dairy husbandry.
7. Entomology.
8. Horticulture. Horticulture is divided into Pomology, Vegetable Culture, Floral Culture and Plant Propagation.
9. Home economics.
10. Plant Pathology and plant physiology.
11. Tobacco investigations and vegetable gardening.

From that list you can see that we cover a wide field, and those departments have in progress today about 145 separate projects. Every year some of these are completed and new ones are taken up to occupy the time or the money that these might be occupying.

I would be glad to give you details of the projects being conducted by the different departments, but that has been printed in our annual report and is accessible to everyone who may desire to consult the list.

I would like to have an expression from the farmers as to whether the type of information we are giving out, or the sources through which we give it out is satisfactory or meeting your requirements. By the Federal act we are required to publish results in bulletin form and distribute them to the farmers. We have a list of about 32,000 farmers on our mailing list. We do not issue every bulletin in that number, because many of the bulletins are of interest only to special agricultural interests, and consequently, they are issued and distributed only to the limited groups that would avail themselves of the information.

But if any of you have ideas how the bulletins might be improved, or would desire to have the information given out in some other form which would be more available or make it more available to you, do not hesitate to make your ideas on these matters known to us, because the information is of little value unless it is distributed and given to you in a form in which you can use it.

I think it might be worthwhile for us to think back for a few minutes over some of the things that have been accomplished for our state by research. The Experiment Station has been in existence for a little over forty years, and I believe the things that it has brought to the farmers of Maryland and brought to the agriculture of Maryland are quite worthwhile. I believe that the agriculture of Maryland during that period has made a very substantial progress, and that research has contributed its part to that problem.

I believe that the farm homes of Maryland, rural conditions in Maryland are very much better than some of us commonly think. I am quite sure that if you apply to farming conditions in Maryland any measure that you would want to apply to it, that farming is very much better today than it was forty years ago.

I have been at the Experiment Station since it was inaugurated, and I have been attending these meetings, Mr. Cohill, all classes of farm meetings in Maryland, for about forty years. If you look at the type of farm homes in Maryland—if you think back over the standards of living, if you think back over the farm conveniences and farm comforts, if you think back over the character of our rural schools, of our roads, and everything of that kind, I think every person here will admit that farming in Maryland has advanced, and is in a good condition, and will compare favorably with the homes occupied by the people of any other industry or occupation. When I think of the farm homes of Frederick, of Washington, of Harford, of Talbot, of Kent, and compare what they furnish with the homes occupied by the people in many of our cities, and of the people who are pumped through subway tubes to homes that they do not want to occupy, and from there to places to work where they would rather not work, and compare those conditions with farm life throughout Maryland, I believe that there are not many of you who would like to swap places with them. So that I think we have every reason to be satisfied with our lot.

Forty years ago I doubt whether there was five acres of alfalfa in the State of Maryland. I am sure that there was not any soybeans being grown out on your farms. Today we have fifty to seventy thousand acres grown annually in the state.

At the time of the first corn show held in Maryland—in fact, there were three held that year, one in Easton, one at Frederick, and another—there was not a single named variety of corn grown in Maryland, and the quality of corn as rated with Maryland corn today was rather poor.

The quality of wheat has improved greatly during that period, and the quality and quantity of hay has improved greatly. Commercial apple growing has been developed largely through that period. We are producing more and better canned products of all kinds. Although we are not ranking first on tomatoes, as we did for a number of years, at the same time we are improving our quality and really increasing quantity. The improvement for the maintaining of quality of our tomatoes in Maryland has been due to outstanding contributions made by research, and varieties that are disease-resistant have been contributed as a result of research.

The control of plant diseases in general, and the control of insects has been largely worked out as a result of research, and this is saving to the farmer thousands and thousands of dollars every year.

I might continue for a long time and enumerate a great many of the outstanding things that research has accomplished. The standard of our livestock has been improved. Our cows are giving more milk. We have more and better cows than we ever had, and the feeding of them has been greatly improved as a result of research. While we have accomplished a great deal by research, there is still room to accomplish a great deal more, and I hope that you will all recognize that research is valuable in your business as it is in the business of any other industry.

A survey made of industries of New England shows that they are putting from one to three per cent of their gross sales back into research, and they find that that pays. If we put a tenth of one per cent of our gross sales into research, it would amount to many, many times what we are spending now. I do not know that it would be justifiable to put that much into research, but it is certainly a profitable thing for you to have research in your business. A thing that seems as perfect to us today as the telephone—yet the telephone company is spending a million and a half per year in their research laboratory. They are thinking way ahead, not for today, but looking years and years ahead so as to meet the problem that is going to confront them. That is the forward-looking thing for the farmer to do, to try and look ahead to meet a lot of these problems.

I said that in the last analysis all of our work is to provide better rural conditions and to make farm and rural life more complete and satisfying.

I believe that it is acknowledged among sociologists that local government is the most backward thing we have in connection with government. Local government has largely been a growth of essentials, and it is in many respects like Topsy—it "just growed." It has a lot of loose ends, and many things that probably might be co-ordinated and systematized so as to be more logical and more efficient and more economical than at present.

Our Governor has made a good job, I believe, at least a commendable job, in systematizing and organizing our state government on a better basis, and I believe that it is due the rural people that a careful study should be made of our local government to see if we cannot accomplish just what I said, to revise our system of taxation, so that it would be far more equitable, it would fall more equitably upon the farmer, and to determine, if possible, whether we can work out some system of local government which would be more economical and more efficient and provide what the farmer desires to a better advantage.

That is a class of research. I would not advise attempting anything of that kind unless we studied it very carefully and worked out and know where we are going before we attempt to make changes. But I am quite sure, from little studies that have been made, that there is great possibility along that line. But I hope that the work that has been inaugurated by the Federal Government in marketing is going to bring great returns for farmers and to make our return for our labor on the farm a good deal better than what we have. But I want to assure you that all of the problems that are confronting the Federal Farm Board at the present time are not going to be solved without a lot of research back of them. In fact, they recognize that at the present time, and have already taken steps to co-operate with the various Experiment Stations throughout the United States to conduct research, so that they can place their work on a more substantial basis.

It is necessary for you, and when I say "you" I mean as individuals and as groups, to co-operate with them, to co-operate with your station in carrying out some of these research problems, and I am sure that if you give the sympathy to the research work in the next twenty-five years that you have given in the past twenty-five years, that you are going to get a great deal of worthwhile information and help, and that the progress made as a result of research will be very worthwhile and possibly more substantial than the progress which will be due to any other one class of effort.

I am glad to see you; I hope you all have a prosperous and pleasant year of 1930, and that when we come back here at the end of another year we can feel that the work of this convention has been more than worthwhile, and that we will have renewed energy and pep to put into our future work. I thank you! (Applause.)

CHAIRMAN COHILL: I want to say to you, fellow farmers, that if you are not in close touch with the Experiment Station you are not on the farm job.

A few years ago, when I started to plant 800 acres in apples, we didn't take a step, even the location of the orchard, the varieties, and everything, without the Station, without having one or two of those fellows up. When one left we sent for another. We were afraid to take a step without consulting them. They have the experience of all the farmers in Maryland, and they get lots of advice from outside of Maryland, from all over the United States. If they give you advice, you can guarantee it is all right. I found that to be the case. I want to say again, if you are not in close touch with your Experiment Station that you are helping to pay for, you are not on the farm job.

SECRETARY STEWART: Here is a telegram I want to have read into the records of the meeting. In preparing for this annual meeting we tried to reach every agricultural organization and every phase of agriculture in the state. We sent out about 15,000 programs through the different organizations to various groups, that is, there were about 10,000 sent out of the state office direct, 1,000 out of the Dairymen's Association, 1,000 out of the Tobacco Growers' Association, around 2,000 sent out from down at College Park to various affiliated groups, besides those which we sent to the florists, the commission merchants and the livestock men out at the stockyards, and every source that you could think of that were related to our problem, and we invited them to come up here and hear the discussions. One group of letters we sent out was to all the officers of subordinate granges and to the State Grange, and I have here a telegram from the Forest Hill Grange of Harford County signed by Roy Tucker, Master.

"Here is wishing to the Maryland State Farm Bureau for the year 1930 the best year ever."

Then I have here a letter dated January 4th:

"The officers and members of Glyndon Grange, 321, have asked me to thank you for your cordial invitation to join in the Farm Bureau meetings at Baltimore next week. The friendly spirit of co-operation expressed by

the Farm Bureau towards the Grange is sincerely appreciated, and you have our very best wishes for a happy and prosperous New Year."

CHAIRMAN COHILL: If you take the Grangers out of the Farm Bureau, I don't believe you would have many left. You know, when we first met down there at the Maltby House you could have gotten them all in two of these rows. It has grown ever since, and is not only growing in numbers, but growing in interest. I think that these meetings here this week have exceeded in interest and in quantity any that we have had yet, and if you will just go back home and each one of you farmers bring another one who has never been to these meetings, I think it will give them inspiration. This thing is going; it is bound to go. It started way down and has gone up, up, up, and keeps on going, and it should double and treble now instead of getting a little increase.

The next thing is the report of the Resolutions Committee, of which Mr. Massey, our Vice-President, is Chairman.

MR. MASSEY: Mr. Chairman and Friends: The resolutions Committee appointed by Mr. Davis met yesterday morning, and we elected Mr. Burgee Secretary, and I will ask the Secretary, Mr. Burgee, to please come forward and read the resolutions.

MR. BURGEE: The Resolutions Committee wishes to report the following resolutions for your consideration:

No. 1. "We commend the Maryland and American Farm Bureau Federations in their work during the past year, and pledge during the coming year our wholehearted support in assisting the officers in carrying out the program of the two organizations.

"We hereby extend greetings to all farm organizations and stand ready to co-operate with any organizations wherein by so doing we can better agricultural conditions."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 2:

"*Bond for Commission Merchants:* The Farm Bureau reaffirms its previous recommendation for the passage of a bill requiring commission men doing business in the State of Maryland to give adequate bond to protect the farmers whose products they handle."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 3:

"*Federal Farm Board:* We approve the actions of the Executive Officers and the Boards of Directors of both the American Farm Bureau Federation and the Maryland Agricultural Society-Maryland Farm Bureau Federation in their efforts to assist and co-operate with the Federal Farm Board in its task of putting into operation the national agricultural policy enunciated in the Agricultural Marketing Act. Recognition in this Act of the economic condition of agriculture which now exists and the effort being made by the Federal Farm Board in its stimulation of co-operative marketing to place agriculture on an economic plane equal to that of industry are actions on the part of the Federal Government in behalf of agriculture which we commend.

"We request all individuals, partnerships, corporations or associations contemplating new developments or expansion in business designed to facilitate co-operative marketing of agricultural products to submit their plans to the Federal Farm Board for its consideration as to necessity and convenience and as to organization set-up; we recommend to our members that approval of the Federal Farm Board be required of any co-operative marketing plan before farmers are asked to participate financially or with membership.

"We pledge our support to the Federal Farm Board in all efforts to secure the broadest possible benefits to agriculture in the control of agricultural surpluses, seasonal or otherwise, and in making the tariff effective on all farm crops. Should it be found necessary to amend

the Agricultural Marketing Act to accomplish these purposes, we pledge our unqualified support in so doing."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 4:

"*Rural Credits:* The Federal laws which have established our rural credit policies should be amended so that from production to final marketing, the producers of our farm crops, the owners of our farm property, and the co-operative groups of our farm producers can have available in all necessary quantities credits at interest rates as low as are secured by any other group in our nation."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 5:

"*Whereas,* the State Department of Markets of the University of Maryland since its establishment in 1924 has borne the responsibility of meeting the marketing needs of the state without funds sufficient to meet more than a small portion of the demands made upon it; and

"*Whereas,* the demands for service in the field of marketing have been growing larger and larger every year; and

"*Whereas,* the National policy calls for more effective work in the field of marketing farm products;

"*Therefore, Be It Resolved,* that we favor more adequate State appropriations for the work of the State Department of Markets in extending the Shipping Point Inspection Service, the Market News Service, Seed Certification, Market Surveys, Roadside Market Inspection, Inspection of Weights and Measures for agricultural products, the Promotion of Co-operative Commodity Organizations and other related lines of work."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 6:

"*Federal Taxation:* Our national wealth is rapidly becoming more of the intangible rather than of the visible

form for tax purposes. This makes it indispensably necessary that the structure of Federal income, corporation and estate taxes be maintained in such form as will procure the most of our revenue for support of the Federal Government from these forms of taxes.

"The nation as a whole is prosperous. The purchasing power of the tax dollar is now comparatively high for debt reduction purposes. An immense Federal debt must be liquidated at the earliest possible moment so that it, together with its interest charges, will not impose undue burdens on succeeding generations. These conditions make it imperative that more attention in Federal tax matters be given to debt reduction than to tax reduction."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 7:

"*Farm-to-Market Highways:* We are at that point in our development of transportation facilities in our nation which requires not only more Federal appropriations to continue and finish the Federal aid system of roads now under construction, but to expand Federal financial participation in the building of secondary or farm-to-market highways. In this enlarged program of highways building, we approve an appropriation of at least One Hundred Twenty-five Million Dollars by the present Congress and such additional legislation and appropriations as will provide the active beginning on the part of the Federal Government in the construction of farm-to-market roads.

"Highways are now arteries of commerce and must be constructed largely at the expense of the nation as a whole and not wholly at the expense of local or state taxing units. The states are urged to extend their supplemental rural road program by allocating more of the gasoline and vehicle taxes to farm-to-market highways."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

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MR. BURGEE: No. 8:

"*Farmer Representation on Federal Boards:* We urge the appointment of farmers on all Federal Boards and Commissions before which the interests of agriculture are involved, and that appointees to such boards and commissions shall be men who have the qualifications necessary to serve with credit to agriculture and to the nation."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the report be adopted . . .

MR. BURGEE: No. 9:

"*Funds for Agricultural Extension:* We reaffirm our position in favor of additional Federal funds for extension service work and strongly urge Congress immediately to enact into law the Capper-Ketcham amendment for this purpose now pending before Congress. We expect the extension service organization with funds now available and with others which we are herewith advocating, to participate more actively in the future in the organization of agriculture."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 10:

"*Rural Education:* We advocate the policy of Federal financial participation in the cost of rural education."

MR. BURGEE: No. 11:

"*Recognition of Co-operative Purchasing:* We favor the recognition by the Federal Government of co-operative purchasing organizations which distribute necessary supplies used directly in farm operation; such recognition to be secured by suitable modification of existing legislation."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 12:

"*Muscle Shoals:* There is no shortage in the supply of commercial fertilizers. The limiting factor is price. This factor cannot be expected to be reduced materially so long as a world combination in which the Chilean Gov-

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ernment has a part, fixes prices. Muscle Shoals should be operated so that its economies will tend to regulate our fertilizer prices instead of the foreign combination controlling them.

"The operation of Muscle Shoals on a vast commercial scale at the earliest possible moment would be incomparably better than to use this great project for mere laboratory research. Such commercial operation is provided in the Madden-Wright Bill, and all necessary research is also provided in that measure without cost to the United States.

"We commend the recent message of President Hoover in advocating a private lease for this project and confining its use to agriculture."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be accepted . . .

MR. BURGEE: No. 13:

"Forest Conservation: Since a constant supply of lumber and lumber products, an adequate supply of water for domestic use, irrigation, and power, and control of our waters against erosion and flood are national necessities, we advocate the conservation of our forests by reforestation of burned-off, cut-over and marginal lands, the immediate establishment of better fire protection with the necessary appropriation of funds, the abandonment of destructive logging practices, and the proper management of forest and range lands to assure adequate watershed protection. We advocate, also, the participation of the State governments in the above program."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 14:

"Organization Policy: Since it is now universally recognized that no national program which relates to social or economic phases of the agricultural problem can be successfully accomplished unless farmers are banded together in a great nation-wide membership organization which can speak for agriculture, we urge all local and

county units of the Farm Bureau to continue their enthusiastic activities in putting into operation our membership slogan, 'There is no substitute for membership.' "

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be accepted . . .

MR. BURGEE: No. 15:

"*General Taxation Principles:* Some Cardinal Principles of Taxation:

"I. We approve and support the American Farm Bureau Federation in the following cardinal principles as indispensable features in any fair taxing system:

"1. The significant facts of any system of taxation, including its social and economic effects, should be under constant and impartial scrutiny and should be given the widest possible publicity as the only proper basis for intelligent modification of any taxing system.

"2. Except for the purpose of equalizing economic opportunity, no special consideration should ever be given to any industry, locality, or class of persons.

"3. Every person owning or operating property for profits, or profitably employed, should, in proportion to his ability, contribute to defray the cost of government, national, state and local. So far as possible, every tax should be universal and direct, for no system of total exemption from taxation or of indirect taxation can promote a wholesome and general public interest in efficiency, economy and honesty in the administration of government.

"4. Every legitimate tax must be, directly or indirectly, a levy on net income as the only equitable measure of ability to pay the tax.

"II. The present property tax situation:

"Estimates by economists indicate the comparatively small percentage of the total national income which is derived solely from the ownership of property, either rural or urban. If a fair allowance is made, as it should be made, for the labor and management of owner-operators, the ownership of property does not produce more

than one-half or one-third, and, in most of the states, one-fourth or one-fifth of the total income of the entire population. Yet, in every state the ownership of property is compelled to bear almost the entire cost of government. In most states, no direct tax whatever is levied upon the larger portion of total net income which is derived from personal industry, thus exempting the greater portion of the population from the payment of substantial taxes.

"With a decreasing percentage of population owning property which is easily taxed, and an increasing percentage depending upon wages, salaries, fees and commissions as sources of income, the gross unfairness of our present state taxing systems is gradually becoming worse. Because of the destruction of property values resulting therefrom, foreclosures and tax delinquency are reaching alarming proportions in many states.

"III. Tax policy of the American Farm Bureau Federation:

"On the principles of taxation stated above and the statement of the present property tax situation in the various states the American Farm Bureau Federation:

"1. Asks for agriculture no advantages or special favors in national, state or local taxation, but does ask for equitable treatment in taxation.

"2. Offers its co-operation to and invites the co-operation of all other organizations and industrial groups in securing constant and impartial study of the facts of taxation, including the social and economic effects thereof.

"3. Urges that as rapidly as feasible, net income be recognized by the states as the most equitable basis for taxation.

"4. Asks that the various states and the Federal Government, for the purpose of equalizing economic opportunities, assume in greater measure the support of the public schools and public roads.

"5. Asks that the Federal Government protect the states using the income tax from the competition of

states not using this tax in some manner similar to the Federal Government's protection of the state inheritance or estate taxes.

"6. Urges that Congress authorize the Secretary of Agriculture to establish in the Bureau of Agricultural Economics a unit with suitable personnel and adequate funds for research in taxation and expenditures as they affect the economic status of agriculture and the welfare of rural population. We believe further, that this unit should co-operate so far as possible with state agencies, including the agricultural experiment stations, and that the experiment stations should further emphasize fundamental research in this field, using for this purpose the funds made available to them under the Purnell Act.

"IV. Some recommendations for immediate action:

"For the purpose of giving some immediate relief from the present grossly unfair taxation of property, the American Farm Bureau Federation:

"1. Asks that the term value as used for the assessment of property be defined not as the fair cash sale or market price, the definition current in most of the states, but as the average capitalized net production value as used in Europe.

"2. Recommends that owners of real estate, urban and rural, in most of the states urge the enactment of state income taxes, with moderate exemptions and moderately progressive rates, to replace part of the present taxes levied on property.

"3. Supports proper control of budgets, bond issues and expenditures, under some plan similar to that employed with such conspicuous success in the State of Indiana.

"4. Urges the study of retail sales taxes on carefully selected commodities.

"5. Recommends resistance by property owners to further increases in tax levies, either for existing purposes or for new purposes, unless the additional funds required

therefor are provided from sources other than the general property tax.

"6. Recommends an impartial survey, supplementing the Federal forest taxation inquiry, to secure reliable information for the solution of the acute problem of state and local taxation, arising out of the fact that the Federal Government owns a considerable portion of the land area of many of the states, thus largely withholding that land from state and local taxation.

"7. Favors the establishment of a department of taxation in the American Farm Bureau Federation as soon as the necessary financial means therefor can be provided."

MR. MASSEY: In No. 15 you will notice the policy laid down in the National Farm Bureau at their convention in December. I would like to suggest to each and every one to take these home with you. Our tax system to the farmer is a burden, and lots of us thought that in our day and generation it cannot or will not be changed, but after being at the convention in Chicago I am satisfied that if we just live a few more years we can get some of this tax system changed to our benefit.

I move the adoption of that resolution.

. . . The motion was duly seconded . . .

MRS. HARRIS: In talking with Dr. DeVault yesterday, he said that he had been making some studies recently on the taxation problem in Maryland, of the taxes which each county is paying, and the kind of property it is being paid on, and especially is he making a study on how the tax money is expended, and I would like to suggest to the Farm Bureau of Maryland that we have a committee to work out this with Dr. DeVault and try to make a study of this plan and present it to the proper authorities in the state.

CHAIRMAN COHILL: That is a very good thought. Do you want to offer that as a resolution?

MRS. HARRIS: I just offer that as a suggestion to the Farm Bureau that they can take action on.

. . . There being no further discussion the motion was put and carried and No. 15 adopted . . .

MR. BURGEE: No. 16:

"*State Income Tax:* We urge that the State of Maryland establish the income tax as a more equitable means of financing most of our state and local government budgets. Such an income tax should and must bring a corresponding reduction in taxes on tangible real estate. The tax burden upon owners of real estate in this state is becoming unbearable, and likewise very unjust."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

MR. BURGEE: No. 17:

"We, the Maryland Farm Bureau Federation, wish to express to the family of Harry C. Busick our deepest sympathy in their great bereavement.

"We appreciate the many courtesies and the fine cooperation given us, before and during this convention, by Mr. Busick and his wonderful organization at the Lord Baltimore Hotel.

"We feel that the City of Baltimore and the State of Maryland has lost, in the death of Mr. Busick, a business leader and a constructive force for the future advancement of the City and State."

DR. SYMONS: I move we adopt this resolution with a standing vote.

. . . The motion was seconded, and the audience arose . . .

MR. BURGEE: No. 18:

"We hereby express our thanks to the Lord Baltimore Hotel, the Mayor of the City, and the efficient Police Department for the many courtesies extended us, and especially for parking space provisions, which made attendance upon our meetings easier on the part of our farm members and friends."

SECRETARY STEWART: I would like to offer one amendment to that to have included in there also the press of the City of Baltimore, and also the respective counties

of the State of Maryland that before and during this convention have given publicity to the meetings.

MR. MASSEY: The Committee accepts that.

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the report be accepted . . .

CHAIRMAN COHILL: I would like to add something there, Mr. Stewart. I know that as soon as this thing is over he will go home and take a good, sound sleep! (Laughter.)

MR. BURGEE: No. 19:

"Last, but not least, we hereby express our sincere thanks to all those who participated in our programs, and to each and all who in various ways helped to make this the most successful meeting it has been our privilege to hold."

. . . It was voted on motion made by Mr. Massey, and duly seconded, that the resolution be adopted . . .

CHAIRMAN COHILL: Are there any other resolutions from the floor?

MRS. WILLIAMS: I have a resolution.

"*Whereas,* the passing of our good friend and Director, Mr. James E. Morris, to rest in peace on Christmas Eve was a great shock to all of his associates in the state, and especially to those associated with him in Kent County; and

"*Whereas,* Mr. Morris was an indefatigable worker and self-sacrificing man for the interests of his community and for the advancement of farmers generally;

"*Be It Resolved,* that the State Farm Bureau, in annual session, hereby expresses its deep regret at the great loss sustained in the death of this good man, and that a copy of this resolution be transmitted to his family and spread upon the minutes of this meeting."

MR. MASSEY: I move we adopt that with a standing vote.

. . . The motion was seconded, and the audience arose . . .

CHAIRMAN COHILL: Are there any other resolutions from the floor?

MR. MASSEY: I move that these resolutions that have been offered and adopted be adopted as a whole.

. . . The motion was duly seconded and carried . . .

SECRETARY STEWART: Mr. Chairman, I would like to make an announcement. Some of you folks around here have gotten some of these pink tickets. That is a summons to come before the Traffic Court and say why you stayed over a little time in a certain place where you parked your car. If any of you have received any of these little tickets, bring them to me, and I will try to see that they are taken care of without any inconvenience to you. (Applause.)

CHAIRMAN COHILL: The next in order is the election of officers.

SECRETARY STEWART: The Constitution of the Maryland Agricultural Society-Maryland Farm Bureau Federation provides that the Board of Directors serves as the body to make nominations for the office of President and Vice-President of the organization. At the Directors' meeting on Wednesday evening, January 8th, our worthy President, Mr. James W. Davis, was unanimously nominated again for the office of President, and our worthy Vice-President, Mr. E. Thomas Massey, was likewise unanimously nominated for the office of Vice-President again. So, as the Secretary of the organization, and naturally, the Secretary of the Board of Directors, I bring to you the action of the Board of Directors.

MR. SNADER: I move the Secretary cast the ballot for the election of the officers nominated.

. . . The motion was duly seconded and carried . . .

SECRETARY STEWART: I hereby cast the ballots bearing the names of James W. Davis, of Harford County, for President, and E. Thomas Massey, of Kent County, for Vice-President of the Maryland Agricultural Society-Maryland Farm Bureau Federation for the year 1930. (Applause.)

CHAIRMAN COHILL: Mr. Stewart will get his job from the Directors. Let us have a speech from the President.

REMARKS

BY J. W. DAVIS

Rocks, Maryland

Mr. Chairman, Fellow Farm Bureau Members: I have no speech, but there are a few things I want to say at this time. I wish to express my appreciation of the support that has been given us during the past year by our Vice-President, our Secretary, our Board of Directors, and all other organizations. We have certainly had a harmonious year, and we have just felt that if anywhere in this state we needed help, all we had to do was to ask for it and we got it, and got it willingly and wholeheartedly.

I also want to express my appreciation of the wholehearted assistance we have had from the Extension Service, which is, of course, Dr. Symons, Dr. Bomberger, and the specialists, county agents, and the home demonstration agents.

It seems as if this matter brings to my mind what I said four years ago when I accepted this position, that if we could just hook this whole team up and get them to pull together, I feel sure we could carry the load. Any measure of success that we have attained has been not from what I have done, but just from the folks that went along and did their part. We certainly have had co-operation in this state during the past four years, and I think that co-operation is more pronounced and more active today than it ever has been. I look forward with a great deal of encouragement to the future of the Farm Bureau and other organizations in this state. We have had the greatest of harmony, and we have got a goal to work for in the future that just gives us a lot of encouragement, and I feel sure that there is no reason why organization in this state should not be a great deal bigger success in 1930 than it ever has been. I know the Farm Bureau membership is stronger and more active. I believe the same thing is true of the Grange, and when

I speak of the Grange I speak of something of an organization that is very close to my heart, because I think most of us were Grangers before we were Farm Bureau members, and we realize that wherever we have a strong Grange organization it is an easy matter to have a good Farm Bureau.

Let us all make a firm resolve that in the coming year we are going to make this thing bigger and better, and as I have said before, I have said so often I think sometimes you folks will think that that is about the only idea I have, but I can't impress on you too strongly the need of everyone feeling a personal responsibility. We can make this thing go by saying that we will do our share. We can't make it go by saying, "Well, I will let Bill Smith, or John Jones do it, and I won't bother about it." You have got to make up your mind that this is your personal job in your county organizations, or the county locals, and if you are going to have the thing go as it should, you have got to make it a part of your job to see that it goes.

It is just the same way all up the line. We have got to accept the personal responsibility; we have got to realize that this is our job, and any measure of success that we may attain will be attained through our united efforts. We can't any of us do the job alone. So I wish to thank you for your confidence, and I will just try to do the best I can. I thank you very much. (Applause.)

CHAIRMAN COHILL: Let us all go back home and help.

How about a little talk from the Vice-President? (Applause.)

MR. MASSEY: Mr. Chairman and Folks: I appreciate this honor very much. You know, I look upon the Vice-President as being the assistant to the President.

PRESIDENT DAVIS: I would like to interrupt him here and say he has been a real assistant.

MR. MASSEY: I was just going to tell you that I believed I had been a very good assistant, because we have elected him again! (Laughter.) I told Mr. Davis when he was elected the first time—and I am very proud of

the fact that I put him in nomination the first time he was elected, and I think every time since, so I think he is more my President than yours, or just as much, and I am here to assist him, and pledge my full support for the coming year for anything he may call upon me to do. (Applause.)

CHAIRMAN COHILL: The next is Unfinished Business. Is there anything under that heading?

DR. SYMONS: I would like to say, in the name of the President, that at the Directors' meeting the other night I presented a report in detail of the expenditures of our state appropriation to the Maryland Agricultural Society. I would like to report for the record that the total appropriation expended in the fiscal year to September 30th, which was audited by the State Auditor and which will come out in a detailed report and given to the Directors, that the appropriation to date—there is a balance of the appropriation of $3,891.74 for the fiscal year beginning October 1st and extending to September 30th. This will appear in the records of the annual report. I simply report this result. I think a motion of acceptance to incorporate it in the annual report would be sufficient.

MR. COCKEY: I so move.

. . . The motion was duly seconded and carried . . .

CHAIRMAN COHILL: It there anything anyone wants to bring up?

MRS. WILLIAMS: May I have a few words? As Chairman of the Home and Community Committee, which is not a separate organization, or has any idea of holding separate meetings, but is simply a committee that hopes to interest the women in the Farm Bureau work, I want to say to you men, when you go back home, that if you haven't a Home and Community Chairman in your county, appoint one, or elect one, or name one, and then tell her that her work is to simply get the women interested to come out to the meetings and to help along.

I have heard them say in some counties, I haven't been able to visit many of the Chairmen of Home and Community work like I did in the Grange work, but I have

heard them say that the men don't want the women. That isn't so. They may not want them in their business meetings, but they want them when they want something to eat! And let me tell you this, that your wife is as vitally interested in the financial end of the farm as you are, and if you will let her help, many times you will have better finances! (Applause.)

CHAIRMAN COHILL: That's right. I tell you, if we get the women on our side and get them together, the Farm Bureau will be a success, all right. I want to tell you another thing. I have said this quite often—I never could see any place on a farm for a bachelor! He is no good on a farm. (Laughter.)

MR. WEAGLEY (Washington County): There are two ladies that I think ought to be mentioned with thanks from this body before we adjourn. It was brought to my attention by a gentleman back here in the rear a while ago that if a man has something to do and he goes back home and doesn't have fellowship in the home, he ought to, with his wife and family. If he doesn't, lots of times it shows on him the next morning. Now, we know that our worthy President has made a success, and he must have fellowship in his home, because when he comes here in the morning he looks refreshed. I would like this organization to extend a rising vote of thanks to our worthy President's wife, Mrs. James W. Davis, and also to our worthy Secretary's wife, Mrs. M. Melvin Stewart. (Applause.)

MR. BURGEE: I think that motion should include Mrs. Massey, the wife of our good Vice-President. (Applause.)

. . . The audience arose and applauded . . .

PRESIDENT DAVIS: I think I should say perhaps at this time that Mrs. Massey has always been a very retiring lady. She is quite nervous sometimes for fear her husband will put his foot in it, or make some mistake. Last night I am sure she enjoyed the banquet very much, because we had Mr. Tom tied up where he just had to be-

have himself. I know she enjoyed the whole thing very much, because I sat alongside of her, and I enjoyed her company. I am mighty glad you included Mrs. Massey in that motion, because you wouldn't have done the job right if you didn't.

CHAIRMAN COHILL: This is all very nice. Is there anything else? If not, we will close this convention with some music, led by Mr. McKnight and Mrs. Harris.

DR. SYMONS: Before we do that, I think we should give a very sincere vote of thanks to Mrs. Harris for her kindness at the piano and Mr. McKnight for his very excellent leading of the singing. I so move.

. . . The motion was duly seconded and carried, and the audience arose and applauded . . .

MRS. HARRIS: I appreciate that very much. I never heard the men sing quite so well as yesterday afternoon. I don't know why it was, whether it was the pieces chosen were the ones you learned when you were growing up or not. I notice people can sing the things they learned when they were growing up better. It is hard to make jazz take on people who have white hair, or no hair at all! (Laughter.)

. . . Singing of Auld Lang Syne . . .

CHAIRMAN COHILL: I want to thank the audience for their kind assistance in this meeting. We will adjourn.

REPORT

of the

Maryland State Horticultual Society

TUESDAY MORNING

January 7, 1930

BALTIMORE, MARYLAND

The First Session of the Maryland State Horticultural Society, held in the Ballroom of the Lord Baltimore Hotel, Baltimore, Maryland, convened at ten-fifteen o'clock, Mr. E. D. McCain, President, presiding.

PRESIDENT E. D. MCCAIN: The meeting will come to order. We will first have the report of the Secretary, Mr. A. F. Vierheller.

REPORT OF THE ASSISTANT SECRETARY-TREASURER

A. F. VIERHELLER, COLLEGE PARK, MD.

Mr. President and Gentlmen:

Your Assistant Secretary assumed the duties of office, after appointment, January 7, 1929. Briefly, the duties discharged were as follows:

Replies to correspondence relating to the functions and affairs of the Society; membership-canvassing letters; attention to membership dues received; letters in regard to a proposed fruit packing law sponsored by the Society; writing and issuing ten (10) Fruit Growers' News Letters; editing and mailing the Annual Report; assisting or conferring with the officers or members of the Executive Committee regarding affairs of the Society.

The Summer Field Meeting was arranged and held at the orchards of W. F. Allen & Sons, Salisbury, on August 1st and 2nd, 1929. An indoor meeting was held at Hotel Wicomico, Salisbury on the night of August 1st. The

courtesy of the Allens on this occasion merits praise, and the gratitude of the Society. Many instructive things were seen and heard during these meetings, and orchard tours.

Your Assistant Secretary has also helped arranging for the present meeting, and desires to thank the officers, the members of the Executive Committee, the Horticultural Department, University of Maryland, and Mr. M. M. Stewart, for their cooperation toward making these meetings possible.

PRESIDENT MCCAIN: We will have the Treasurer's report from Mr. Canby.

MR. G. RUST CANBY: Gentlemen, since the books of the Society are open to all members of the Society, I shall not go into a detailed report, but beg to report receipts of $312.41, with expenditures of $127.07, leaving a balance on hand, $185.34. I request that a committee be appointed to audit the books.

PRESIDENT MCCAIN: The next thing on the program is the President's annual address. When I had this to do last year, I didn't expect to have to repeat it. I would like to make a little explanation now as to why there was a second term in this Society. I believe your Nominating Committee last year didn't feel altogether free to state why they were nominating the same officers for the second term.

At that time the State Legislature was in session, and our officers and Executive Committee were doing all they could to put through an appropriation through the legislature to have a new horticultural building built at College Park. At the time our meeting was held last year this program had not been completed. We felt reasonably sure we would get the appropriation. So that is the reason your Nominating Committee last year felt that it would be wiser to keep in office the ones who were familiar with action regarding this appropriation.

I am very glad to report that this appropriation for a new horticultural building at College Park, has gone

through the Legislature and has been approved by the Governor. We have a start that will help the members of our horticultural staff at College Park to carry on their work more efficiently.

This building has not yet been started, and I guess will not be started until probably the middle of this year or next year when the money becomes available.

Just in this connection, I think it would be well to state that we owe to Senator Withgott a great deal of thanks for getting this appropriation. He acted as our representative in Annapolis both with the legislative bodies and with the Governor, and did his work very efficiently, and I think he is entitled to a vote of thanks from this Society for what he has done.

We have very good speakers this morning, and I will call on Professor J. H. Gourley, of Columbus, Ohio, who will address us on "Orchard Soil Management."

THE PLACE OF SOD-MULCH AND FERTILIZERS IN THE ORCHARD PROGRAM IN OHIO

BY J. H. GOURLEY, COLUMBUS, OHIO

So long as orcharding is not standardized to the place where every successful grower follows the same methods of accomplishing the desired end, just so long will there be divergent opinions and perhaps controversies as to which system is best. And since there never can be a standardized procedure in the East because of the widely varying conditions under which orchards are grown we must reconcile ourselves to the fact that different methods of procedure may be equally successful.

Now any study of orchard culture presumably has as a background the practical matter of profits. Profits have as a background high yield per tree and per acre of good quality fruit. Quality has as a background, among other things, high color for the variety and good finish as well as freedom from blemishes. In the attainment of these aims orchard culture plays a part.

In the discussion set forth in this paper it should be understood that we are not discussing the tillage of orchards. That matter is not under consideration, except incidentally, but rather the possibilities of growing trees in sod, plus fertilizers, in the grass mulch, in legume soil covers, and the general use of fertilizers in the modern orchard. Neither are we making direct recommendations for Maryland but rather we will attempt to give you something of our experience in Ohio with these various methods.

Sod Culture with Fertilizers

The vision that most of us have of a sod orchard is not particularly pleasing. Sod often means neglect and we have said in the past that the sod system is the poorest way of all to grow an orchard. In the main this is true, but there are locations where tillage would be worse because of the serious erosion that would take place. The first essential in the hill country is to prevent loss of the surface soil. The farther south one goes the less the soil is held together by frost during the winter and spring months. It is then that much erosion occurs. As a result of more extensive observations in such country we have changed our opinion somewhat in regard to the use of sod in those sections. For instance thruout parts of southern Ohio, Indiana, Illinois and other regions where tillage is not favored and mulch material is scarce and expensive, a type of sod system is prevalent and reasonably successful. The sod is usually scant over the orchard area, and beneath the shade of the trees there is just enough to bind the soil together so that it does not wash. When fertilizers are applied regularly to the trees the plant food deficit is provided for and the trees make a good growth, are of good color, the yield is satisfactory and the color of the fruit is good.

Much the same situation obtains in Indiana where it is reported that "The harmful effects of grass may not be so noticeable on older trees where most of the space be-

tween the trees is covered by spread of the branches. Under these conditions the growth of grass is almost nil and trees under such a sod system are usually quite productive if given annual applications of nitrogen.[1]" In the main, however, their trees grown in sod were considerably below those in straw mulch or cultivation, in growth, productiveness, and regularity of bearing.

The chief limiting factor in most sod orchards is nitrate nitrogen. The heavier the sod the greater is the competition for this element. Hence a rich, fertile soil presents greater difficulties than a less fertile one where the grass growth is meager so that nitrogen can be supplied without serious loss to the competing grass. In some of our experiments it has been necessary to plow orchards in which there was a heavy stand of blue grass for with no amount of fertilization used did the trees make a satisfactory response, but remained of rather yellowish color and unfruitful. Heavy grass beneath the trees must be discouraged either by plowing, discing each spring, or mulching sufficiently to destroy the grass growth. Of course as the trees become older and shade the ground the grass tends to disappear beneath the trees.

But whether we favor this system or not we must face the fact that there are thousands of orchardists employing it and no other seems to gain much headway in those regions. The teachings of our own experiment station have always been to use a mulch and supplement it with nitrogen beneath the trees and super-phosphate between the tree rows for the benefit of the grass. The sod system without annual fertilization is all but fatal under most conditions,and may be dismissed as undesirable where anything else can be used.

Grass Mulch

But the mulch system of orcharding has been a contender for a major place in Ohio for some thirty years or more. Serious questions were raised in the beginning as

[1] Indiana Exp. Sta. Bul. 315.

to whether it would prove adequate but that time has passed, for many orchards that have been mulched thruout all this time have been productive and have suffered from none of the hazards which were predicted. Occasionally we see an orchard where the more level and fertile portions are under cultivation and the poorly drained, rough and less fertile portions are grown in mulch because of difficulty of cultivation. Here the tilled trees are larger and more productive, but surely an unprejudiced observer would not expect to learn anything from such a comparison. The mulch system is successful, but like any other is not without faults.

But before discussing its present status it is necessary to deal briefly with one of the recent outstanding contributions of soil science which has received wide attention. This has to do with the effect of a mulch of straw, grass, or other carbonaceous material upon the nitrate content of the soil. The explanation is that the plants or trees must compete with the bacteria of decomposition for the nitrogen supply of the soil. Until these plant residues are decomposed the growing crops are likely to suffer nitrogen starvation unless the soil is well supplied with this element.

A recent report from New Jersey gives the results from the use of 1, 2, 4 and 8 tons of dry rye straw per acre cut fine and incorporated in the surface 4 or 5 inches of moist loam soil just before planting corn barley and soybeans. The untreated soil as well as that receiving the varying amounts of straw were treated to liberal amounts of superphosphate, muriate of potash and ground limestone. Nitrate of soda at the rate of 320 pounds per acre was also applied to the corn and barley and to half of the soybeans. "With the use of 4 and 8 tons of straw there was a distinct depression in both the germination and growth of the corn and barley." They showed a need for available nitrogen despite the application of 320 pounds of nitrate of soda. In the case of soybeans there was a slight increase in yield from the use of straw at the rates of 1, 2 and 8 tons per acre without

nitrogen as well as with it. Apparently there was no nitrogen starvation in the case of the legume.

These depressions in yield in the case of non-legumes did not hold over into the second year when no additional straw was used.

The third year the applications of straw were repeated and the application of nitrogen doubled, with the result that the corn showed no ill effects from the straw. "There was apparently enough available nitrogen for the crop and also for the soil microorganisms."

The authors conclude: "The work furnishes convincing evidence that the depressing effect which is sometimes produced by the application of dry organic matter is due to the taking up of available nitrogen by organisms which use the organic matter as a source of energy."

Without following this matter farther, we may say that there is a large amount of evidence to show that straw and grass mulches, as well as such crops as rye plowed into the soil result in a depression of plant growth together with all the signs of nitrogen starvation. But after this material has decomposed the nitrogen content is actually higher than where none was used. Furthermore, it seems evident that the chief, if not the only deleterious effect, is nitrogen deficiency and this can be supplied by the use of artificial fertilizer, in such forms as nitrate of soda or sulphate of ammonia.

Now as a result of this work the statement has been made that the grass mulch system of orcharding is fundamentally wrong. But any attempt to generalize from an annual crop such as grains and vegetables to a perennial crop such as apple trees, where the underlying portions of the mulch are decomposed and hence in the stage where nitrogen is not limiting, is erroneous. The reasoning comes out in the wash. The best argument that the same situation does not obtain with orchards is gained by examining the orchards themselves.

But first let us briefly examine the nitrate content of the soil under these different types of treatment, for this seems to be the key to the situation.

For the past three years nitrate records were made in the Station orchards each week during most of the growing season. The following figures give a summarized average for the different soil treatments:

	3-yr. Ave. nitrates p. p. m.
Beneath trees standing in sod	3.90
Beneath tilled trees	7.71
Beneath straw-mulched trees	8.39

In corroboration of these data we take the liberty of quoting from the Indiana work already referred to which gives the nitrate content of soil taken at three times during the season:

Indiana Experiment Station

	3 determinations 1918
Beneath trees	
Sod land	1.3
Grass cut and let lie	3.05
Tillage-cover crop	11.61
Straw mulch	23.95

So we see that nitrates are not limiting beneath the mulch as compared with tillage, and the growth and yield of trees is in close agreement with the nitrate content of the soil.

Let us now briefly examine a few orchards with which the writer has had intimate contact or are well known to him. We have one 7-acre variety orchard at Wooster (O), that was planted in 1893. It was planted to corn for four or five years and since that time, or for about thirty years has been constantly mulched with straw or other litter so that the grass is destroyed as far out as the drip of the branches by a layer of straw mulch some three or four inches thick. Until four years ago no manure or fertilizer had been applied. A half dozen of the better known varieties have been selected as representative of this orchard. Careful yield records have been kept for the past 18 years and the average annual production calculated on an acre basis is here given:

Yields of Varieties in Ohio Experiment Station Orchard for 18-Year Period, 1910-1927, Inclusive

Ages 17-35 years

Variety	No. of trees in record	Average annual production per acre of 40 trees
Northern Spy	6	504 bushels
N. W. Greening	2	796 "
Rome Beauty	3	692 "
Grimes Golden	2	824 "
Baldwin	5	636 "
R. I. Greening	2	652 "
Average of 6 varieties	20	684 bu. or 14 bu. per tree (48 lbs. per bu.)

In an adjoining orchard of Grimes, Jonathan, Delicious and Collins planted in 1900, the average yield per tree in a ten-year period (1910-1919) for different cultural treatments was:

Sod	2.9	bushels
Grass mulch	5.6	"
Cultivation	5.4	"

No fertilizer nor manure was applied during the period of the experiment, hence it was entirely a test of cultural systems on a silt loam soil.

Near Cincinnati we have an orchard, planted by the Experiment Station in 1912 composed of Grimes Golden and Jonathan. The average yield for the 6-year period from 1922 to 1927 is as follows:

Average per tree, per year all trees in the grass-mulch	219	pounds
Average per tree, per year, all trees in tillage	200	"

In an adjacent county a seven year average shows the following average yield per tree:

Grass mulch	246	pounds
Tillage-cover crop	229	"

An orchard owned by T. E. Thornburg & Son a few miles from Wooster is an excellent illustration of high production in a mulch orchard. Unfortunately records

are not available but the orchard is conspicuous for its vigor and high annual yields. The blocks of Grimes and Baldwin would average well over five hundred bushels per acre, according to careful estimates. These trees were cultivated for the first 5 or 6 years but have been mulched 25 years, and have been fertilized for the past six years. Our personal acquaintance with this orchard must be offered as evidence as only limited data are available. Another mulched orchard, 20 years old, owned by Elihu Blakeslee, some twenty-five miles north of Wooster has yielded at the rate of 400 bushels per acre for a period of years, and the trees are in excellent vigor and show no signs of injury from the mulch.

Many figures could be cited to show satisfactory yields from mulched orchards but suffice it to say that as long as the mulched orchards continue to bear so well that they need to be heavily thinned there need be no controversy regarding the value of this system.

Mr. Ballou who has had charge of the experimental work at the outlying farms, mostly in southern Ohio, writes as follows: "At a number of points we have maintained annually tilled and over-cropped sections in comparison with the grass-mulch plan of orchard management. Not in a single instance of which I am aware, has any grower been induced by what he has seen to adopt tillage as his method of culture. The grass-mulch method is more firmly established in Ohio than it ever has been previously."

The Indiana experiments were conducted in southern Indiana. The soil is a "silty clay loam" and "the topography varies from rolling to very rolling." "The soil washes easily, and it is apparent that some system of soil management beneficial to orchard trees other than clean tillage must be worked out," according to the authors of this bulletin.[1] They conclude:

"During the second five year period of these studies or the seventh to the twelfth year for the trees, growth and production have been greatest with trees receiving culti-

[1] Loc. cit.

vation with cover crops. Where trees were in grass but receiving a heavy annual application of straw for mulch, growth and production were about equal to those under cultivation." The difference between the two systems was not significant.

While the mulch has been successful in southern Ohio where much of the land is hilly it has also been widely used in central and northern Ohio where tillage could be readily followed. The mounting costs of cultivation together with the convenience are largely responsible. The chief hazards in the past have been mice and fire. But neither one nor both combined has been serious enough to lessen the number of mulch orchards altho there have been occasional losses. Another and comparatively new hazard is now to be met with. This is the spread of the apple flea weevil which overwinters as an adult in the grass at the surface of the ground or in the litter beneath the trees. During the following spring and summer the leaves are riddled by the feeding of the beetles and by the mining of their leaves within the leaf tissues. Clean tillage has been recommended as a treatment and some orchards in the State have been so treated. We have considerable confidence, however, that other means of controlling it will be found.

The cost of growing trees under the mulch is less than tillage altho the difference will tend to be less significant as the orchard becomes older. Furthermore, the whole gamut of orchard operations is likely to be less under this system. In one orchard planted at our Station in 1915 it has cost $10.00 per tree to grow the trees to their present age in tillage-cover crop and $9.29 per tree under the mulch. This includes all operations except interest on investment and taxes.

Hence, we conclude that the grass mulch is at least as popular today as at any time in the past. It may be less desirable than cultivation, equal to it, or superior, depending upon the conditions under which one is operating an orchard. Not only is this true in Ohio but there is a

growing interest in many sections of the country in some system wherein the orchard land need not be cultivated.

Legumes in the Orchard

One of the most signicant changes in cultural practice that has come to our attention is the shift from the far-famed clean tillage of the Northwest to the seeding of the orchards to alfalfa or other legumes. Depletion of soil nitrogen was apparent on every hand as indicated by poor growth, yellowish foliage, and decreasing yield as well as small size of the fruit. When nitrogenous fertilizers were applied to the soils an improvement was noted at once, in most cases. However, when fertilizers were added to soils on which good crops of alfalfa or clover had been growing for a few years there was rarely any additional response from the fertilizers.

Dr. Magness makes the following comments on the situation there. "Recently there has been a great deal of interest in sweet clover as a cover crop and under certain soil conditions it is proving extremely satisfactory. Apparently it is more satisfactory than alfalfa for opening an impervious subsoil since the plant is an annual and forms large roots which die and decay at the end of one year's growth."

"The fruit growers of this state are a unit in believing in the advisability of maintaining legume cover crops in the orchards. Even with legume cover crops many orchardists find it advisable to apply at least additional nitrogen while many growers are applying complete fertilizer along with the cover crops. The use of commercial fertilizer in our apple orchards is rapidly increasing notwithstanding the maintenance of cover crops in many orchards."

Where it is possible to grow and maintain alfalfa, sweet clover, or other legumes this would seem to be a worthy goal of all orchardists. It probably has more advantage than any other system. True there are many places where it would be out of the question, would cost

more to establish them than they would be worth, but doubtless they can be adapted to a much wider area than at present. Wherever there is an adundance of lime as well as all the mineral nutrients both alfalfa and sweet clover can be grown. It is estimated that from 100 to 150 pounds of nitrogen per acre is fixed annually from these crops, which is equivalent to 500 to 750 pounds of ammonium sulphate. We believe that the use of these legumes will become much more extensive in the East during the next decade or two. And they can be used successfully even in peach orchards where we ordinarily think cultivation should prevail. Manure is difficult to obtain and we must do something to increase the humus and nitrogen supply of peach soils. The alfalfa does not compete with the trees as does blue grass and timothy.

Fertilizers

The third phase of this paper deals briefly with the use of fertilizers in the orchard. So far as Ohio orchardists are concerned the use of fertilizers in a sod or mulched orchard is almost as firmly fixed as spraying. Tilled orchards may or may not be fertilized depending upon the experience of the manager. We have pointed out previously that cultivated orchards are less likely to show a response to fertilization than those that are not tilled. The explanation for this has already been covered in the discussion of sod and mulch. There are less nitrates available under sod because of the competition between grass and trees and also there seems to be fewer nitrates formed under blue grass and timothy. In fact there are few more striking lessons that have been learned and taught by the experiment stations of the country during the past twenty years than the value of nitrogenous fertilizers in the orchard. Their use is a poor man's proposition for if there is anyone who can afford not to use them it is the rich man. Increases of 100 to 300 percent from their use is common, depending of course upon the needs of the trees.

We find in many cultivated orchards that fertilizers give an improvement in vigor of trees and an increase in yield, while in many others there is no benefit. Furthermore, an orchard may not respond at one stage of its development and later on give a definite response.

One of the ever interesting questions in this connection is the value of the different carriers of nitrogen. Our Station has experiments in several counties of the State in both apple and peach orchards and the data at present indicate that there is little preference in the returns secured from equal quantities of actual nitrogen between nitrate of soda and sulphate of ammonia. In one place nitrate gives best results and in another sulphate is best. In others, as well as in the peach orchards, no differences are yet apparent, both doing equally well. The newer synthetic forms of fertilizers are also being tried and some of them will probably find a wide use in the future.

Organic forms, such as dried blood, tankage, and bonemeal are occasionally recommended but the experiments show them to be less effective and more expensive than the inorganic forms.

Our practice is to apply approximately a quarter of a pound of nitrate of soda for each year of a tree's age, so that a four year old tree receives one pound, a 20 year old one, 5 pounds, etc. This is broadcast or sown beneath the outer branches about two weeks before bloom, and being soluble in water it does not need to be worked into the soil.

When the application is divided and part applied at the usual time and the balance during early summer no benefit has resulted as yet over the usual method. Fall applications have given some rather surprisingly good results but we are not warranted in their recommendation in the East to replace spring treatments. In the Northwest a good deal of the fertilizer is now applied in the late fall.

We would like to make brief reference to a growing notion that the *nitrogen only* program of American orchardists is working havoc with the keeping quality of our fruit, and that much internal breakdown is due to the

use of nitrogen alone instead of a complete fertilizer. Unfortunately there is not sufficient evidence in our literature to answer this question with finality, but until this information is available the orchardist desires some guidance as to what his practice should be.

Many fertilizer experiments have been conducted about the country in which complete fertilizers were used in comparison with nitrogen only. The evidence in favor of the former is so meager and unconvincing in most cases as to have led horticulturists generally to confine their recommendations to nitrogen beneath the trees and phosphorus between the tree rows for the benefit of the grass or the cover crop or intercrop.

However, notice must be taken of this renewed interest in complete fertilizer for it is conceivable that exclusive nitrogen treatments may reduce keeping quality, along with a reduced coloring of the fruit. We have some extensive experiments in progress along this line at the present time. While the results are incomplete and insufficient to justify conclusions, yet it may be said that in the storage tests which have run three years and now in their fourth the fruit from trees highly fertilized with nitrate of soda have kept as well as that from trees receiving normal treatments. We would only suggest at this time that there appears to be nothing about which to get panicky and until the evidence is clearly to the contrary the regular treatments of nitrogen should continue in our Eastern orchards, the amount per tree being regulated according to the needs. It must be remembered that the phosphorus applied in the commercial forms is immediately fixed when it touches the soil and remains there in an insoluble form, so that it is a question whether we have actually furnished our trees with a complete fertilizer even tho we have spread it on the ground.

So we draw this discussion to a close with the conclusion that the sod system of orcharding is usually inefficient and not to be recommended when another is feasible, with certain exceptions already mentioned. That straw mulch with nitrogenous fertilizer is frequently, altho not

always, as efficient as tillage under Ohio conditions. That the orchard is more easily handled when seeded down to grass or alfalfa and the fruit is often higher colored and of firm texture.

PRESIDENT MCCAIN: Professor Gourley has certainly brought us a very instructive and very interesting talk. We are particularly interested in his statement with regard to nitrogen breaking down the keeping qualities of the fruit. We all know that is one of the criticisms the buyers have had of Maryland fruit. Maryland fruit growers have been very large users of nitrogen.

Our experiment station at the present time is carrying on experiments in this line, and it is very interesting to know the results that Ohio has gotten in this as they started experiments before we did.

MR. A. L. TOWSON: In the cultivated orchard, how do you keep up the moisture?

PROFESSOR GOURLEY: We attempt to do it by the type of cover crops we use—we use soy beans a bit, buckwheat quite a little, rye, and vetch. I don't think we have adopted any one cover crop that we feel is the best one, but in all cases we used cover crops. In our northern orchards which are better supplied, where the moisture is held more retentive perhaps of the somewhat cooler climate, you are not going to lose organic matter so quickly as you would farther south. The farther south you go, the more serious that would be. But we attempt to do it with cover crops.

MR. TOWSON: What about sweet clover?

PROFESSOR GOURLEY: We think very, very well of sweet clover, particularly in soil conditions that are poor. If we can get in sweet clover and then plow that down deep for a few years, we think it is splendid. We think the earlier in the life of the orchard you can do that, the better, particularly if it could be done before the orchard is placed. In the older orchards, I don't think that is very successful.

MR. DWIGHT WALKER: Do you think mulch is not desirable on peaches in sandy land?

PROFESSOR GOURLEY: Frankly, I haven't had much experience with sandy soil. I don't know. I can show you peach orchards in Ohio, I doubt if there are any better orchards in Ohio, and they are treated that way. Stuff is cut and put around those trees, more or less of a mulch, stuff such as alfalfa. We tried using blue grass sod for mulching them, but for our conditions I wouldn't say it was very satisfactory even with fertilizer, but where we could get a legume, particularly alfalfa established as we have in some of our orchards, we are having excellent results.

MR. AARON NEWCOMER: How many times did you cut the alfalfa in the season?

PROFESSOR GOURLEY: Two to three times.

MR. D. GOLD MILLER: I understand that in Virginia the pine mice don't increase as badly in alfalfa as they do in sweet clover. I don't know if there is anything to that. We had no trouble in getting a stand of sweet clover. We also got a reseeding by cutting the stubble eight or ten inches high; the second growth came right along and reseeded. I understand that if you cut the stubble very close the sweet clover does not come up any more.

PROFESSOR GOURLEY: We get a very satisfactory second growth from that seed from our sweet clover. I don't know what your experience is here. Now, about mice—I think that is an important thing to mention for any of you who are thinking of transferring over to the mulch system, because you can get some very serious injury from mice. They are worse in a mulch orchard. There are several things I think we ought to do about the mice. If they are bad, we ought to poison them. I think it should always go along with the mulch system where there is any indication of mice. Get a good dog or two and train them to go through the orchard, and you will be amazed at what they will do in the way of destroying mice. We have a couple of dogs there that we have trained, and we have never had any trouble from mice in our mulch orchard, and they have been in mulch a long time. I don't

mean we have never had any trees nibbled, but we have never had any particular damage from mice.

MR. NEWCOMER: How many years have you had your orchard in alfalfa?

PROFESSOR GOURLEY: Well, I should say we were rather newcomers in this matter of alfalfa in the orchard. The best orchard in alfalfa that I can think of right now that has been continuously in alfalfa, has been there six or seven years. In those cases they have frequently seeded to something else and some alfalfa and got something of a stand and plowed it in the next year and reseeded just as if they had never done it, and that second time they got a splendid stand even in a section where we call the soil fairly acid, not in our limestone region. In the limestone area, the peach orchard I mentioned—somebody asked about alfalfa—that is on limestone soil where alfalfa is rather at home. In those regions the alfalfa is disked with a disc and chopped all up in the spring and let go, and the stuff comes right up, and there is no difficulty in maintaining it. The orchards are in good condition.

You would have to ask Dr. Auchter about that. I don't know whether that would be recommended in this section or not, but we have some that look very good. It seems to me if we could have an orchard in alfalfa, both apple and peach, it would be a good system.

PRESIDENT MCCAIN: Our next speaker is Dr. A. H. Heinicke, Ithaca, New York, head of the Pomology Department of Cornell University, who will talk on, "Factors Influencing the Set of Fruit."

POLLINATION AND OTHER FACTORS AFFECTING THE SET OF FRUIT WITH SPECIAL REFERENCE TO THE APPLE

BY A. H. HEINICKE, ITHACA, NEW YORK

There is much confusion of opinion concerning the need for cross-pollination in orchards. This has arisen chiefly because of the failure to realize the complexity of the processes determining the set of fruit and the relative

importance and limitations of any one factor. Pollination, for example, is an essential step in the development of the fruit from the flower to maturity; nevertheless, many other inter-related conditions determine the final set. A crop failure on trees with a good bloom may thus result in spite of provisions for cross-pollination, and on the other hand, in exceptional years fair crops may be harvested in almost any orchard.

Shedding of Fruits a Natural Process

In a discussion of the conditions that influence the set of fruit it is well to keep in mind what normally happens to the blossoms in the orchard. As a rule, more flowers are shed than remain on the tree to form the crop. Much of the bloom is lost soon after the petals fall, and a large number of partially developed fruits are thrown off during the next few weeks. The June drop, which generally occurs about six to eight weeks after the period of bloom, marks the end of this period of wholesale shedding.

The elimination of superfluous flowers and young fruits is by no means undesirable. If too large a proportion of flowers remain attached to the trees, the fruits are likely to be undersized and of poor color. Furthermore, a heavy set may leave the trees in a weakened condition which renders them very subject to winter injury. Over-production may also be responsible, in part at least, for the habit of alternate bearing of many varieties.

On the other hand, it sometimes happens that there is an abundance of bloom year after year, but little or no fruit is harvested. This failure of flowers to set in sufficient numbers constitutes one of the most serious problems of fruit production and is responsible for heavy losses to many growers.

It is important to remember that the blossoms of our fruit plants are very delicate and highly specialized structures which exist, as such, only a short time. Unless the blossoms are rejuvenated and stimulated to further growth shortly after the petals expand, they soon degen-

erate, become inactive, and are soon shed from the tree. The shedding of flowers and fruits that fail to make a lively growth is entirely normal and is comparable, in many respects, to the shedding of leaves in the autumn.

Provisions for removing inactive fruiting structure are found in a thin plate of tissue located at the base of the flower stem. The cells of this tissue have the ability to alter their adhesive properties and thus cause the loss of the entire structure beyond the zone of separation. This special function of separation, or abscission, is easily brought into play not only at blossoming time but throughout the early stages of fruit development. After the June drop, however, the connecting tissues are strengthened and the cells at the base of the fruit stems do not respond so readily to conditions that previously caused them to separate from one another.

Proper Pollination Needed

From the point of view of the grower, pollination may be regarded as an essential step in keeping the flower attached to the tree by stimulating growth and starting the development of the fruit.

The importance of proper pollination for the set of fruit has been emphasized repeatedly at growers' meetings and in the horticultural press. It will be recalled that the process of pollination involves, first of all, the transfer of the pollen grains from the pollen sacs to the stigma. This is done mainly by insects, especially bees. Each bee may carry many thousand grains of pollen on its body and is an efficient worker when weather permits. After the pollen reaches the stigma it germinates and forms a tube which extends to the egg or seed cavity. So far as the plant is concerned, the final result of the pollination process is attained when the contents of the pollen grains are fused with the contents of the egg cells. This fusion, as you know, is called fertilization, and it is an essential step in seed formation.

Satisfactory pollination, as judged by the resulting crop, is secured in many orchards containing but one va-

riety. This is true in many large blocks of Baldwin, York Imperial, Jonathan, and other sorts which usually produce well with their own pollen when the bloom is good. Such varieties are spoken of as self-fruitful or self-fertile. A larger set usually results from cross-pollination, that is, when two varieties pollinate each other, but this is not always since many varieties under good growing conditions set as much fruit with their own pollen as the tree can properly mature. On the other hand, there are some varieties, including many of great importance such as Rhode Island Greening, McIntosh, Delicious, Stayman Winesap, and many others, for which cross-pollination seems essential for the best results.

The behavior of fruits with respect to the need for cross-pollination is not necessarily a clear cut variety characteristic, and it is certainly not consistent. Young trees of McIntosh, for example, sometimes set fruit with their own pollen, but as they grow older the greater stimulation of cross-pollination seems to be necessary for the best results. A given variety may be listed as self-fruitful in one locality and under certain soil conditions, but may require cross-pollination under other conditions of growth. Baldwin, for example, which apparently does well with its own pollen in New York, is reported to require cross-pollination in Ohio. It is interesting to note that many of the standard varieties in the older orchards, such as Baldwin, York Imperial, and Yellow Transparent, are self-fertile to a satisfactory degree, while some of the newer varieties, such as McIntosh, Stayman Winesap, and Delicious, are self-sterile and often fail to set in large blocks.

Varieties chosen to provide the benefits of cross-pollination should be known to be satisfactory for that purpose. They must, of course, bloom at approximately the same time and they should produce an abundance of viable pollen. Varieties such as Stayman Winesap or Baldwin generally have poor pollen, while Delicious, Oldenburg, or Grimes are usually good pollen producers. We cannot be certain, however, that all varieties which do have an

abundance of viable pollen are capable of causing a set on any other variety. It has been definitely established in the case of cherries, for example, that Napoleon, Bing, and Lambert fail to set their own pollen and also when planted adjacent to each other in the same orchard. These varieties, nevertheless, set fruit when properly pollinated by a fourth variety and they themselves are capable of causing a set on other than the named varieties. We do not know how general is this condition, which is known as cross-incompatability, but some evidence indicates that it may exist in other fruits as well as in the cherry.

Provisions of cross-pollination must be made with special reference to the years when conditions will be below optimum, that is when there is only a brief period during which the insects can work. A temperature above 65°F. is essential, and when the weather is clear, warm and calm, pollination is easily accomplished. The best distribution of pollen occurs in adjoining trees. Where two varieties are to be planted in equal number, a row of one may be alternated with a row of the other sort. Some prefer to have two to four rows of one variety and then one or more rows of another. In providing pollinators in a solid block of one variety at least one tree in nine should be top-worked for this purpose. Distribution of flower-bearing branches of a good pollen sort placed in tubs of water throughout the orchard may be employed as a temporary expedient until the top-worked trees begin to bloom.

Competition for Water and Nutrients Between Young Fruit and Leaves

While pollination is necessary to stimulate activity of the flower and young fruit, continued growth cannot take place unless there is an abundant supply of water and nutrients. If the growth of young fruits is greatly retarded at any time before the June drop, the abscission layer which causes shedding will soon form.

The young fruits must compete for water and nutrient materials not only with each other but also with the vig-

orous shoot growth and the rapidly expanding leaves. Fruits that cannot obtain these necessary growth producing substances will fail to maintain their activity, and if this occurs during the period when abscission is easily brought about they will be shed even though they have had the initial stimulation of cross-pollination.

In general, flowers and young fruits have a poorer chance than leaves to obtain the necessary water and nutrients whenever the supply is limited. This can be demonstrated by the following simple experiment. A ring of bark one-half inch wide is removed from a branch two inches or more in diameter. The sapwood is then cut with a coarse saw to a depth of one-half an inch, after which the ring of bark is replaced and held firmly in its original position by small nails. This is done just about the time the flowers are opening. In a branch so treated the water from the soil must pass through the older, less efficient wood near the center of the stem. Under such a handicap the leaves can obtain enough water and nutrients to remain active and to make a fair shoot growth, but practically all of the flowers and young fruits on that branch will be shed. It is evident, therefore, that the fruit cannot obtain water as readily as the leaves.

It may seem strange to suggest that under natural conditions and when the soil is abundantly supplied with moisture, the heavy drop of flowers and fruits may, nevertheless, be due to a lack of water for these structures. That this is by no means impossible becomes apparent when one considers first, that the leaves may transpire water more rapidly than it can be supplied from the soil, and secondly, that the abscission process is easily brought into play by unfavorable conditions that may last for only a few hours at a time. A mature tree may lose as much as a gallon of water a minute during a period of several hours when the weather is warn, clear, and sunny. Transpiration is, of course, greatly reduced during the night and during cool, cloudy or rainy days. At such times water is stored in both woody and fleshy tissues of the

tree from which it is again withdrawn during periods of excessive water loss.

While the water needed by the tree must, of course, come from the soil, the actual amount available for the growing fruit depends upon the rate of transpiration of adjoining leaves and also upon the ability of the roots to absorb the water from the soil, and upon the ability of the trunk and branches to conduct it from the roots to the various parts of the tree as rapidly as it is lost.

Pruning and the Set of Fruit

Pruning frequently results in a distinct improvement in the amount of fruit that remains after the June drop. In some experiments with the varieties McIntosh and Rhode Island Greening, for example, the bearing surface of 15-year-old trees was reduced by one-fourth to one-third without reducing the crop. Varieties such as Delicious are also helped by relatively heavy pruning. In many cases it has been observed that the heavy pruning incident to top-working often helps the set on the remaining branches.

Pruning done during the dormant season limits the loss of water in the spring when competition is most likely to cause the abscission of the flowers and the fruits. This conservation of water is accomplished by the removal of a large number of buds, each of which ordinarily gives rise to about 20 square inches of foliage which, in turn, would transpire considerable water. Furthermore, the supply of water to the tissues remaining after pruning may actually be increased since the undisturbed root system capable of supporting the original top will be required to support a smaller initial leaf surface.

In pruning, many smaller branches and much weak growth is removed, but the larger limbs and the trunk are usually not disturbed. It is of interest to note that the wood of the trunk and of the large branches, as well as vigorous growth, offers the least resistance to the flow of water from roots to leaves. While the conducting tissues

normally present may be more than sufficient to allow the water to move to the leaves as rapidly as it can be supplied by the roots, in pruned trees there is an extra margin of safety for the young fruit during the brief periods on clear, hot days when transpiration goes on at an excessive rate. The amount of water held in the trunk will also be relatively greater for the reduced leaf surface, so that there is less danger of incipient wilting which may bring about the drop of fruit.

By reducing the amount of foliage and the fruit-bearing surface, pruning also brings about a better supply of soil nutrients, especially nitrogen, to the remaining top. With less initial leaf surface, a smaller amount of carbohydrate food is manufactured and this condition, together with a good water and soil nutrient supply, causes invigoration of many growing points. The resulting shoot growth with its many large leaves tends to replace the foliage eliminated by dormant pruning. Fortunately, however, so far as the fruit setting process is concerned, this replacement of foliage requires many weeks and is usually not advanced far enough to offer serious competition with fruit for water at the time it is easily shed. The leaves on heavily pruned trees may be even more efficient in manufacturing food materials than less vigorous foliage on non-pruned trees, and the fruit benefits accordingly in size and quality.

In order to receive the best results from pruning, so fas as the set of fruit is concerned, the trees should be in a thrifty condition with an abundance of nitrogen available for vegetative growth. Relatively little immediate improvement in the crop is to be expected when the trees to be pruned are of low vigor. Very young trees which have not yet begun to bloom or which have not yet attained sufficient size to bear worthwhile crops should, of course, not be pruned except where it is necessary to train the branches.

The Relation Between Soil Moisture and the Set of Fruit

Since all the water used by the trees must come from the ground, a good supply of soil moisture is highly de-

sirable for the set of fruit. In New York State a dry soil in spring is seldom responsible for the inadequate water supply which may cause abscission. In fact, there is often too much rather than too little water at that time of the year. The drought is more likely to occur after the June drop when it influences the size of the fruits rather than the set. Cultivation early in the spring tends to conserve moisture by the destruction of weeds, but this operation is important so far as the set of fruit is concerned primarily because of its influence on the nitrate supply. This factor will be discussed later.

It is important to remember that an abundance of soil moisture does not necessarily indicate a good supply of water to the growing tissues of fruits and shoots. Much depends upon the activity of the root system and its function in absorbing moisture. Water enters the plant through the delicate root hairs which are in intimate contact with the minute soil particles. These root hairs, which ordinarily cannot be seen with the naked eye, are produced near the growing point on fibrous roots, which in turn originate from the larger roots with which we are more familiar. A healthy root system can begin activity early in the spring soon after the frost leaves the ground and several weeks before the buds open. When the soil is warm and well aerated, considerable new growth may be made so that water can be abundantly supplied to the leaves and flowers when they finally appear. Under such conditions, the chances are good for a satisfactory set of fruit provided, of course, some pollination has been possible.

On the other hand, if the soil remains cold and waterlogged while the atmosphere is warm, the leaf surface on the trees may develop without a corresponding development of the roots. Thus there would be produced a large amount of transpiring surface which is dependent upon an inefficient root system to replace the water lost. A heavy drop of fruit is often associated with such unfavorable soil conditions for active root growth.

Unfavorable Conditions for Root Activity that Reduce the Set of Fruit

Lack of drainage. Unfortunately, many orchards are located on soils which are fairly well drained during average seasons but which fail to provide suitable conditions for the best root growth during years of excessive rain in autumn or early spring. Unless there is a good supply of oxygen the root hairs cannot grow and function normally. The amount of water absorbed is, therefore, limited and not enough may reach the fruit to prevent abscission.

If the soil remains water-logged and excludes air for a long time, the roots in that region become greatly weakened and finally die. Such shallow root systems are common in orchards where the water table during the fall and late winter is close to the surface. If dry weather should prevail before new roots can be formed to replace those killed, the entire tree as well as the fruits may be lost. It should be clearly understood that the full benefits of cross-pollination are not to be expected where the soil conditions are such that the roots cannot do their part in supplying the necessary water and nutrients required for a good set of fruit.

Winter injury. On certain soil types many of the smaller roots are killed by cold during the winter thus obviously restricting the absorbing surface. While such injury may not immediately influence the vegetative growth, the set of fruit is apt to be reduced by a limited water supply. In some years the low temperature seriously injures or kills the cambium in the main roots near the crown of the tree without, however, killing the smaller roots at lower depths. In such cases water may be absorbed and conducted through the wood to the top of the tree for some time. However, if the bark is not healed over or replaced by bridge-grafting within a few months after the injury occurs, the root will gradually exhaust the stored food and finally die. A similar result follows girdling by mice or rabbits. A heavy shedding of flowers

and fruits on certain branches can often be traced to such loss or injury of roots primarily responsible for supplying water to that portion of the tree. It should be pointed out that the reduction in the set may occur one or two seasons after the original injury. As we shall see later, the immediate results may be an actual improvement in the set.

Faulty cultivation. A rather sudden reduction in the water supply may result from cultivating too deep and too close to the trunk. Where the larger main roots are cut the extensive absorbing surface of the fibrous roots farthest from the tree cannot function. Deep plowing or disking the soil even beyond the spread of the branches may cut off many fine roots found within four to six inches of the surface, but in good soils such rootlets will be only a small part compared with those at lower depths and they are renewed readily. However, where the soil is very shallow or where the water table happens to be near the surface, such deep cutivation done just about the blooming time may prove harmful to the set since only a few roots will remain to absorb moisture.

Too close planting. Given sufficient space, the roots of most fruit plants extend for a considerable distance beyond the branches. In closely planted orchards, however, the root growth is confined to smaller limits and the water absorbing area is thus restricted. The set of fruit if often satisfactory in badly crowded orchards. Thinning the stand of trees by the timely removal of fillers or by cutting out diagonal rows of trees may sometimes result in a marked improvement in the number of fruit that remain on the tree after the June drop.

Soil type. The soil type has an important bearing on the growth habits of the root system and greatly influences its ability to absorb moisture. A well drained, well aerated soil will give up more of its moisture to the tree than a heavier type. The water holding capacity of the soil is largely influenced by the physical structure and the humus content. The ability of the roots to obtain the

water held by the soil is influenced also by the fertility of the soil. Even though trees may continue to grow and occasionally produce a crop on poor soil types, the conditions are very unfavorable for a set of fruit in many years, primarily because the roots cannot function properly.

Nitrogen in Relation to the Set of Fruit

Emphasis has thus far been placed on the water supply as one of the factors that influence the set of fruit, but many nutrients obtained from the soil solutions are also essential for the normal and active growth which prevents abscission. Nitrogen is especially important in this respect, and a deficiency of this element in the tissues of the tree may often be responsible for a heavy drop of flowers and young fruits.

Nitrogen is used in relatively large amounts by the expanding leaves and flowers and also by the young fruits so that competition may be keen. Part of the nitrogen required may be stored the season before the flowers open in the bark of roots, in the trunk and in branches near the buds, but in many cases a large portion of this element must be supplied from the soil in early spring. Since the soil solution is taken up by the roots, it follows that conditions that restrict root activity will tend to limit the absorption of nutrients which may be available in the soil. It is of interest to note, however, that the amount taken into the plant is not proportional to the water absorbed.

Sod orchard. Trees growing in grass usually lack nitrogen and they frequently show a striking increase in the set of fruit as well as in vegetative growth in response to applications of sodium nitrate or other materials carrying the element in a readily available form. For example, on a number of branches originating on the unfertilized side of the trees growing in sod there were 326 flower-bearing spurs, 39 of which set fruit; on similar branches arising on the side of the same tree receiving sodium nitrate just before bloom 352 flower-bearing spurs set 126 fruits. In some demonstration orchards the untreated trees in sod

produced 3 bushel of apples each, while trees receiving early applications of sodium nitrate produced an average of 11 bushels.

In order to produce the desired results, the nitrogen fertilizer must be applied before the flowers open. Some experimental results indicate, however, that caution must be exercised in making heavy applications in very early spring prior to the time foliage appears. During a prolonged period of cool weather the leaves may not expand rapidly enough to utilize the extra nitrogen taken up by the roots. In such cases, the excess might result in injury to the flowers, causing the abscission of the entire cluster. Where there is a heavy sod the amount applied should be equivalent to at least two pounds of sodium for each 100 square feet of surface covered since much of the nitrogen will be taken up by the grass and the tree roots will get only what is left. Of course not all the space between trees need be covered. In a mature tree having a spread of 35 feet at least 18 to 20 pounds would be required and this should be spread in a narrow band 12 to 15 feet from the trunk. If more area is to be covered, the amount must be increased. It should be pointed out that the red color may not develop sufficiently if too much nitrogen is available late in the season. Small trees require less nitrogen in proportion to the spread of the top.

Cultivated orchards. While nitrate applications are generally necessary on sod, they may also prove beneficial to the set of fruit on trees in cultivated orchards. This will be the case when the soil remains cold and wet late in spring, or if cultivation cannot be done early. Under such conditions the micro-organisms responsible for converting the nitrogenous matter into a form available to the roots cannot function properly, and as a result the flowers may fail to obtain the optimum amount necessary to insure rapid growth and development. A soil which is so low in fertility or so sandy that it does not support a good volunteer crop of weeds will benefit little from cultivation without the addition of nitrate fertilizers.

If cultivation is to supply the nitrogen needed for a good set, the soil type must first of all have a good supply of humus and it should be of such a structure to permit good drainage. Since nitrates do not accumulate until several weeks after the cover crop has been turned under, it is important to plow in late fall or very early in spring. Plowing done after the bloom may help the size of fruit that did stick and possibly bring about an accumulation of nitrogen in the tissue for the following season. The set during the present season, however, cannot be influenced by such late plowing. Where cultivation has been done regularly for many years without adding manure or cover crops, the original humus and nitrogen store may be reduced to such an extent that nitrate applications will prove helpful in increasing the crop.

As to the specific effects of nitrogen on the process of fruit setting, much remains to be learned. It is known that relatively large amounts of this element are needed for active and rapid development of tissues. Under conditions of rapid growth as we have seen, the abscission layer responsible for the drop of fruit is less likely to form. While more water may actually be transpired by vigorous foliage rich in nitrogen, such succulent leaves are less apt to withhold or even withdraw water from the flowers or young fruit as previously described. With an abundance of nitrogen, these structures are thus in a better position to compete for the needed water and other growth producing substances. It is of interest to note also that the sapwood laid down under the influence of a good nitrate supply is very efficient in conducting water and seems to favor the rapid movement from roots to leaves.

The presence of nitrates in the soil apparently stimulates a more fibrous root growth with correspondingly greater absorbing area. Such a root system is probably more efficient in taking the water and nutrients from the soil. This is indicated by the fact that in dry seasons trees well supplied with nitrogen will remain in a thrifty condition even though the soil moisture content may be

reduced below that found under trees receiving little or no nitrates. All of these effects of nitrogen on growth relationship tend to help the set and development of fruit.

Fruit Setting as Influenced by Conditions that Govern the Supply of Carbohydrate Food

In addition to water and soil nutrients, the developing fruits require large amounts of carbohydrate and other food manufactured by the leaves. Without this they cannot grow rapidly and hence they fail to withstand the influences that lead to abscission. As in the case of nitrogen and other nutrients, much of the carbohydrate food used for early growth of roots and leaves, as well as for the initial stages in the fruit development, is stored in the tissues during the previous year. As soon as the leaves expand, however, they begin to produce food which may be utilized immediately.

Ringing. That the amount of fruit which sets is markedly influenced by the carbohydrate materials stored in the tissues of the tree after the flowers are formed may be demonstrated by the following experiment. A narrow band of bark is removed from a limb two or more inches in diameter early in spring about the time the flowers are opening or sooner. The set of fruit above the point of ringing will usually be much heavier than in other parts of a tree having a similar bloom.

Ringing is often a very effective means of causing a set of fruit on varities such as the Winesap group which are known to have a tendency to produce weak flowers, and under proper conditions an increased set may result from this practice even though other means fail. However, if the trees have a very low reserve of nitrogen, ringing may not have the desired effect in improving the set of fruit. It has been shown previously that much nitrogen is necessary for the development of flowers and for the growth of young fruits. The removal of a ring of bark not only prevents the downward movement of carbohydrate materials manufactured by the leaves, thus causing an accumula-

tion of this food above the ring, but it seems also to inhibit the upward movement of nitrogen from the roots. The supply to the fruit is thus limited to that which was stored in the tissue before the bark was removed. If the removal of bark is delayed until just before the flowers open, more nitrogen can reach the growing tissues and ringing will, therefore, be more effective in increasing the set of fruit.

With respect to the effects of ringing on the set, it is known that an accumulation of carbohydrate materials brings about a strengthening of fibrous tissues and increases the thickness of cell walls. The fruit is thus held more firmly to the cluster base by the stronger connecting tissues, and the thick cell walls seem to respond more slowly to stimuli that tend to cause abscission. Furthermore, the ability of the fruit tissue to obtain water is improved by the increase in carbohydrates resulting from ringing. This is also true for the leaf tissue but to a lesser degree. With its normal handicap thus reduced, the fruit is in a better position to obtain the necessary water and nutrients in competition with the leaves. The fruit can, therefore, grow actively and remain on the tree with an adequate water supply.

Condition of growth during the preceding season. Normally, a good carbohydrate supply for the set of fruit depends on a healthy, well nourished leaf surface not only during the crop year but also during the preceding season. The efficiency of the foliage depends to a large extent upon the natural soil and weather conditions, but it may be influenced also by cultural practices such as pruning, fertilization and spraying. The importance in keeping the foliage thrifty and free from insects and diseases even in an off year cannot be overlooked if the best conditions are to be provided for a satisfactory set of fruit the following spring. It happens not infrequently that the grower, having experienced several crop failures due to lack of cross-pollination, neglects the care and especially the proper spraying of his trees. After several years of such neglect, even the best provisions for cross-pollination

will fail to produce a satisfactory set. Even hand-pollination of the flower on neglected trees with strong pollen will not cause the fruit to develop.

The previous year's crop. During a heavy crop year a large part of the food manufactured by the leaves is required to mature the fruit. Often such a heavy crop prevents flower bud formation, but even though the flowers are formed, the limited amount of food stored in the trunk and roots under such conditions will constitute a distinct handicap for the process of fruit setting the following spring. This is well illustrated by the experience of the growers in the Champlain Valley during the year 1925. That spring the bloom was very good on most of the McIntosh trees, but relatively little fruit was harvested from the younger orchards, whereas the old trees had a heavy crop. Pollination and weather conditions were the same for trees of all ages. In the year 1924, however, the young trees had had a heavy crop, while the older trees bore little or no fruit.

The poor set of fruit following a heavy crop may be due not only to the reduced amount of carbohydrates available for the initial stages of fruit development, but also to the smaller amount of stored material available for early root activity. The importance of the early root growth in supplying water and nutrients has already been discussed. Winter injury to the trunk and roots of the tree is also likely to follow a heavy crop year, which may likewise limit the amount of growth producing substances that reaches the fruit. It is apparent, therefore, that the tree must be kept unusually vigorous in a crop year to provide the good storage of food essential for a satisfactory set of fruit. Thinning of the fruit so as to leave a larger leaf surface for each of the remaining apples will not only help in developing quality, but is also an important factor in increasing the amount of food stored for the following season.

The Importance of Pest Control in Relation to the Set of Fruit

Attention should be called briefly to the importance of proper control of insects and diseases that may reduce the set of fruit. Fruit that is well pollinated and growing on vigorous spurs often fail to develop because of the work of scab, bud moth, red bug, codling moth and numerous other pests that attack the leaves as well as the flowers and young fruits. Unfortunately, some of these pests are especially difficult to control during years when weather conditions are otherwise unfavorable for a good crop. Extra care at such times is, therefore, well worth while and should not be neglected if the best results are to be obtained from cross-pollination.

Too much attention cannot be given to the timeliness and thoroughness of the spray application which is to insure clean fruit as well as a satisfactory set. An unusually heavy drop is sometimes associated with injury from dusting and spraying. This is especially true when the trees are in a weakened condition to begin with or if they are sprayed at the wrong time with the unreliable spray materials or with mixtures that are too strong. Spraying or dusting with sulphur or other materials while the flowers are in bloom is not a safe practice and may cause heavy shedding.

As previously indicated, it is also important to keep the foliage healthy even in an off year if the leaves are to function to the full extent and store an abundance of food extent and store an abundance of food material required for early growth and for initial stages in fruit development.

The Predominating Influence of Weather on the Set of Fruit

A discussion of conditions that influence the set of fruit would be incomplete without special reference to the weather. This single factor is of dominating importance since it has a controlling influence over the processes con-

cerned in tree growth and in the development of flowers and fruits. Whenever the flowers are killed by cold during late winter and early spring, a crop of fruit, of course, is not to be expected, but frequently the flowers may bloom and appear to be normal even though the essential parts have been destroyed or greatly reduced in vitality. Flowers injured by low temperatures often fail to produce normal pollen, or the embryo may be incapable of being fertilized. Seed formation and fruit setting are thus greatly reduced even though the weather at blooming time may be favorable.

The influence of temperature, wind, and rainfall on the process of pollination, fertilization, root growth, water supply, nitrate formation and other conditions that in turn affect the set of fruit has been discussed in the preceding pages. Unfavorable weather conditions, especially during the time that the trees are in bloom, are encountered so frequently that it seems wise to insure against crop failure by making all other conditions as favorable as possible. Trees which have been growing vigorously and which have been kept healthy are much more likely to produce some fruit in years when there is only a minimum number of hours of weather suitable for the process of pollination.

The grower should realize that when the weather is especially favorable and when there is an abundance of bees and ample opportunity for cross-pollination he may get too many fruits on trees in good vigor. Removal of the excess fruit by hand-thinning is necessary in such cases and this is a very important practice, not only for the current year's crop but also for the next season's set.

Conclusion

In the foregoing pages the importance of pollination and of other factors in obtaining a set of fruit has been outlined. It is evident that in any intelligently managed orchard program it is to the grower's advantage to make careful provision for pollination according to the location

of his orchard and the varities to be grown. This involves first, the selection of varities which are good pollinizers with particular attention to the time of blooming; second, planting or top-working these in the orchard in sufficient quantity and properly spaced for easy pollen distribution; and third, making sure that a supply of bees is either in or near the orchard at blooming time. It should be borne in mind also that even with such provision cold or rainy weather may prevent pollen distribution and crop failure result.

Further, if an orchard is to derive the benefits of cross-pollination it is essential that it be in a favorable condition of growth so that the developing flowers will be abundantly supplied with water, stored food and mineral nutrient. This involves the fundamental requirements of suitable soil with particular emphasis upon drainage, and a favorable site with reference to exposure. Furthermore, the best practices in pruning, spraying and good soil management cannot be neglected. Occasionally special practices, such as ringing, deserve consideration. When the grower has provided all of these, he can but trust to luck that conditions beyond his control will not prevent his getting a crop.

DR. HEINICKE: A gentleman just asked a question that I am going to refer to Dr. Auchter—which is the best, sulphate of ammonia or sodium nitrate.

DR. AUCHTER: I don't believe that question can be answered for all conditions. You will find that over the country different soil types, different orchards, one material seems to give about as good a result as another. Here in Maryland the experiments conducted by the Maryland Experiment Station so far, we find that if your orchard needs nitrogen pretty badly that nitrate of soda seems to be a little more quickly available in the early spring, and we do get the increase in spur growth that Dr. Heinicke has just been talking about. We do get a great increase in terminal growth that first year if we use nitrate of soda instead of ammonium sulphate.

But after the trees have received nitrogen for two or three years and are in a good vigorous condition, you just need to apply nitrogen to keep them going. Either material seems to do very well. This has held true in all of our experiments in this state, and by the observations of commercial fruit growers in many parts of the state. We were rather fortunate in finding fruit growers side by side, one using nitrate of soda and one ammonium sulphate several years after those orchards, to begin with, were not very vigorous. Most people can see the difference the first year in favor of nitrate of soda early in the season. The nitrate seems to be immediately available, and the ammonium sulphate becomes available a little slower and begins to show up later in the season.

So I would say in this particular State of Maryland that if the orchards are rather low in vigor, you need to get them started, and nitrate of soda would be preferable, at least for a year or two until they get in a pretty good vigorous condition. That does not hold true, however, apparently in all states and under all soil conditions in the country.

MR. D. GOLD MILLER: I was glad to hear Dr. Aucther make that statement. We changed this year from nitrate to sulphate. We have been using nitrate for three or four years, and we have changed to sulphate of ammonia this season.

DR. AUCHTER: There is no doubt but that you will get good results from ammonium sulphate. All of these nitrate carriers give good results, but the growers here in Maryland some five or six years ago were not satisfied when we said, "Yes, they will all give good results." They said to us, "If there is a 10 per cent difference in results, we want to know it." So the Maryland Experiment Station started a good many experiments and gave them very close and careful observations and made very careful measures. That 10 per cent difference more or less in most of these orchards showed up in favor of nitrate of soda.

MR. J. A. COHILL: Does the time the fruit is picked have much of an effect on the next year's spurs?

DR. HEINICKE: That would probably hold for some of the earlier maturing varieties such as your Yellow Transparent. After you get the fruits off, of course, if the trees are still vigorous and dark green, they will have an opportunity to manufacture food, and store up for next year's crop.

On the other hand, take varities such as Oldenberg which is harvested early with us; if you have a heavy crop one year you may not have the next year. So it would not hold true necessarily, although it would seem if the leaves are capable of manufacturing food late in the fall, they would have an opportunity to manufacture more and store more if the fruit was taken away.

MR. J. H. WILCOX: I would like to ask Dr. Aucther the result of the experiments with nitrate of lime?

DR. AUCHTER: We have not used nitrate of lime long enough at our Experiment Station here in Maryland to give you comparative effects. It is being used now in Western Maryland, in fact, we have one plot in Mr. Andrew Cohill's orchard, but that has not been used as long as these other nitrogen carriers. One year's results, I believe, are not enough to try to compare the two.

MR. GEORGE HARRISON, JR.: In regard to Dr. Gourley's talk on cover crops, sweet clover, etc., which are to be grown during the season, what steps are taken to take care of the bees that are used in pollination during the year? Are they removed so far from the orchard that they cannot reach it, or are they allowed to suffer from the poison spray that drops on the cover crop?

PROFESSOR GOURLEY: We have made no provision such as you speak of to remove the bees, and we have had no serious cases of bee poisoning that we have traced to arsenic. I know there are places where that has been reported, and it is probably true. We have traced a number of cases that looked like that which turned out to be something else.

MR. HARRISON: Dr. Heinicke has been conducting experiments with pollination; I would like to hear what he has to say on the subject.

DR. HEINICKE: Certainly the bee men are worried about the dust that has the arsenic in it. If it is applied during the time the flowers are open, undoubtedly it will injure the bees, but that is not the only problem, because the dust sometimes drifts to adjoining blocks or adjoining plants which will bloom somewhat later. The bee men seem to feel that the number of bees in New York since dusting began has decreased, but it has not been thoroughly studied, so we are not sure that the decrease in bees is due to dust entirely.

We have made some recent experiments in which we find that even dusting with sulphur alone during the time that the trees are in bloom is not the best thing. I know of one case where the sulphur dust was applied even before the flowers were open, and the bees apparently misled by the fact that that stuff was good to eat, took that dust back to the hive, and apparently it killed a lot of them.

PRESIDENT MCCAIN: We will adjourn for luncheon.

The meeting adjourned at twelve twenty-five o'clock.

TUESDAY AFTERNOON

January 7, 1930

The Second Session convened at one-forty o'clock, President McCain presiding.

PRESIDENT MCCAIN: The meeting will please come to order.

Before calling on the first speaker of the afternoon I would like to appoint the committees.

NOMINATING COMMITTEE

J. WALTER ENGLAR, Chairman
A. G. TOWSON
FRANK HANSON
W. H. LONG
JOE HARRISON

RESOLUTIONS COMMITTEE

J. ANDREW COHILL, Chairman
LEE ALLEN
A. H. NOFSINGER
AARON NEWCOMER

AUDITING COMMITTEE

M. D. MOORE, Chairman
ANDREW HANSON
HENRY KLEE

We are now ready to go ahead with the first talk of the afternoon by Dr. A. Lee Schrader, College Park, Maryland, on, "Color and Size of Peaches as Influenced by Pruning and Thinning."

DR. LEE SCHRADER, Mr. President, Ladies and Gentlemen: Perhaps to most of you the subject which I have selected for today on pruning and thinning may be more or less shop-worn. But when we consider that we have had some rather important changes in our production program, these subjects are open for reconsideration. In the first place, we have been recommending some rather recent changes in our pruning methods; that is, we have been recommending a lighter pruning for young trees, and a moderate type of pruning for old trees which will be explained later with some slides to show the type of pruning I have in mind. In the second place, we have a heavier fertilization, that is, a heavier use of nitrogen. We have thus produced more growth and more foliage on our trees. Thirdly, with the use of paradichlorobenzene to control borers, we have produced a sound trunk which

is better able to conduct water which helps to give us greater growth and a larger tree. Fourth, we have been advocating more strongly the use of cover crops for incorporating organic matter in the soil, which in turn, has its effect on the growth of the tree. By lighter pruning, more nitrogen, borer control, and organic matter we have been producing larger crops which, of course, is the aim of our production program.

Larger crops means we must put more peaches on each tree, or increase the size of each peach to such a point that we increase our production without increasing the number of peaches.

The question arises, if we put more peaches on each tree, how about size and color? If we have too many peaches on a tree, we know that we are going to have reduced size and probably reduced color. If we use the recommended practices we are going to have lots of foliage and strong growth, which means perhaps some shaded fruit.

What can we do with pruning and thinning to get size and get color and still maintain our production up where we want it, and also maintain the vigorous trees so that we will have continued high production? What determines production of size? In general, we would say water and elaborated foods. As regards color, again we might say in a general way, light and elaborated foods.

This means, in dealing with these factors, that we must so distribute the available water as to get the desired size of fruit, and also to expose such fruit to light; at the same time developing a strong growth with a large leaf area to manufacture the elaborated foods. Thus in dealing with some of these factors we are taking on a large order and it may require some juggling which, as you know, is more or less a good habit of the horticulturists; juggling of factors.

In considering thinning, most of you know that the effect on size has been pointed out many times in the past, and, although we may have mentioned color in the same breath with size, the emphasis has not been placed as to

the effect of thinning upon color that should have been given. Thinning in affecting size, gives us more water and more elaborated food and more light supplied for each fruit. Thus in dealing with our factors we are taking care of all of the factors affecting size and color in a general way.

The advantages of thinning and the results we have obtained at Maryland have been discussed previously by Dr. Auchter in 1927 in the report of the Society. So I will not give you any figures, but will point out that the Maryland results gave large increases in size of the fruit and quality of fruit.

Thinning has been considered recently to be especially important in view of the larger crops. But we may be fooled some times and may find that some thinning will not be beneficial and some growers may say, "Well, what's the use of thinning? I got just as good fruit as my neighbor did with thinning."

We might look at the thing from another angle and say, "Let us consider thinning as an insurance." There may be some years you may not get your money back from thinning, but if we do thin, then we have that insurance which will help us over a dry period such as we had during 1929. But in any event, a man that does thinning has to use some common sense on how much he is going to reduce the number of peaches on each tree.

Now, how can we use pruning as an aid in influencing size and color? Our recent recommendations of pruning trees lightly may seem to some of you to be rather paradoxical, that is to say, we leave more wood on our trees, and theoretically, you might get poorer color because of the less open condition, especially on the younger trees. But when we consider the facts in the case we have certain effects of lighter pruning on young trees, and these effects aside from the earlier bearing of good crops and the production of larger trees are as follows:

First, we have this big advantage of the lighter pruning in opening up the tree with a crop, that is, as a young tree bears a crop it opens up with the weight of the crop

more or less like an umbrella, exposing the fruits to light, and thus furnishing us with good color. As far as size is concerned, we usually do not have any difficulty in obtaining size on young trees, although there again we must use common sense in dealing with the number of peaches which any tree will be able to carry at a given size. We may have an overload on the young tree.

The large leaf area which is maintained on these lightly pruned trees gives us, of course, an aid in production of the elaborated foods so necessary in the production of size and color. The opening of the tree with the weight of the crop is obtained not only with the younger tree, but also as the tree gets older, when you have a large tree resulting from the lighter pruning. This tree still continues to open up and spread out and expose the fruit to the light with the lighter crop. This would not be possible if you reduced the crop by heavy pruning and did not have the weight of a large crop to spread the tree. In addition, the shortening of the limbs by heavy pruning is another factor which you must consider. The old heavy pruning system which was used in the past on many of our orchards, if used now with our addition of nitrogen, organic matter, and borer control, gives us a dense, rank growth which tends to grow straight up in the air, and we have a production of shade that has been found in Maryland to produce small crops of green fruit.

Size, then, cannot be obtained by heavy pruning, if this size is obtained at the expense of color and amount of fruit. Pruning has its effect on increasing size, but in many cases it may not have an effect on size where we prune rather lightly or moderately because there may be an increased set of fruit as a result of pruning.

In considering older trees we have recommended moderate pruning. Moderate pruning in this case means mostly thinning out and some cutting back. But it does not mean shearing the tree down to a uniform table top at the height of a man, or a couple of feet above his head, but means that we are producing with moderate pruning a large tree which may be twice as high as a man, and we

depend upon the large crop to bend this fruit down to harvesting distance and in a position where color is produced.

Pruning of old trees has been tried to take the place of thinning of the crop, and in this case we usually get too much pruning. The tendency of the grower has been to shift towards the heavier pruning, and in so doing reducing his crop and losing out merely from the standpoint of production, or total production per tree.

PRESIDENT MCCAIN: Has any one any questions to ask Dr. Schrader?

MR. HOOPES: I would like to ask if it is advisable to cut out those small twigs inside the tree when they die. It means a good deal of work to cut those out.

DR. SCHRADER: It doesn't make much difference whether you cut those out or not. A peach tree will pinch off a dead limb. Occasionally we may have mummied fruits or something like that hanging on one of those limbs, but as a general rule, a lot of those small limbs just pinch off or are knocked off in harvesting, and we do not bother much with them. Of course, when a limb has considerable diameter and has been shaded off and died we cut it off. But these small twigs do not bother us.

MR. TOWSON: You wouldn't advise thinning some of them back, those small ones on the inside of the tree?

DR. SCHRADER: The first year when those small branches are produced, if they are more or less of a sucker nature we cut them back perhaps a third and let them fruit if they have any fruit buds and take advantage of such a situation. As I said, much of the fruit may be borne inside the tree; that is an advantage. But after they become weakened and dead, they are usually pinched off, of if they are large enough you prune them off.

PRESIDENT MCCAIN: We had a very interesting talk this morning by Professor Gourley, and we are now going to have the privilege of hearing him again. He will talk on, "Factors Influencing the Coloring of Fruit."

SOME FACTORS WHICH INFLUENCE COLOR OF FRUIT

BY J .H. GOURLEY, Columbus, Ohio

Professor L. H. Bailey once told me that he considered the outstanding problem of the present day orchardist was to produce a finer finished product and deliver it to the consumer in better condition. Recently we read in the press that "color is the most important single quality factor in the sale of American fruits. Under-colored apples cannot be forced on the market at No. 1 prices." In other words color is paramount on the market for people continue "to eat with their eyes." The demand is for a *green* Rhode Island Greening, a *yellow* Grimes Golden and a *red* Jonathan. Color becomes of real economic importance.

What Is Color?

The question may properly be asked, What is color? Of what does it consist? Under what conditions does it develop? Color is, of course, familiar to us in nature. Green is most common although other colors in flowers, fruits and leaves are likewise familiar. These colors are due to small colored bodies within the cells known as plastids and the plastid pigments are responsible for the orange, yellow and green colors. Other colors are due to soluble anthocyanin pigments, such as blue, purple, violet, magenta and nearly all the reds. Other colors such as scarlet, orange-red, browns and black are often produced by the presence of both plastid and anthocyanin pigments together in the tissues. Yellow color is frequently due to carotin and xanthophyll, both constitutes of the chlorophyll of green leaves.

The anthocyanin pigments arise from a product known as chromogen which in turn depends for its existence on a supply of carbohydrates (sugars) which are the first products of the green leaf. Hence if there is a shortage of reserve foods in the plant the anthocyanin may fail to develop because of a lack of chromogen. This relates the

whole problem of color back to the nutritional condition of the tree, together with available sunlight and temperature. So long as the nitrates entering the plant unite with sugar to form proteins there will be no accumulation of carbohydrates from which chromogen is formed. This is the situation in trees making excessive growth and producing fruit of poor color.

Relation Of Leaf Area To Color

It would follow what has been said that a tree with insufficient leaf area to properly mature its crop would produce fruit of relatively poor color, since the sugars are produced in the green parts. This situation has been produced experimentally by Magness in the state of Washington. We take the liberty of using the following table from his work:

Table I

Relation of Leaf Area to Sugar Content and Color. Delicious Apples, Wenatchee, Wash., 1928.

J. R. Magness, Proc. A S. H. S., 1928

No. of Leaves Per Apple	Sugar Content, Per Cent			Solid Red Color Average Percent of Surface
	Reducing	Non-Reducing	Total	
10	9.19	0.45	10.06 9.64	23
20	10.23	1.01	11.24	
30	8.96 9.96	2.12 1.51	11.08 11.47	26
50	9.20 10.11	2.44 3.07	11.64 13.18	42
75	9.62 10.84	3.60 3.29	13.22 14.13	51
	9.92	4.86	14.78	58

This table shows that an increase in color is developed as the number of leaves per apple increases. Therefore, up to a certain point the more leaves the higher the color provided they do not shade the fruit. This observation of excessive crops being poorly colored has frequently

been made. We recall an experience some twenty years ago when some thinning work was carried on in the orchards of W. W. Farnsworth near Toledo, Ohio. The heavily thinned Grimes Golden trees developed apples of a golden yellow color and frequently with a pink blush on the exposed cheek, while the adjacent trees bearing a very heavy crop were small and greenish in color.

These observations may be supplemented with some recent ones at the Ohio Station when in 1929 C. W. Ellenwood conducted some thinning tests in a Jonathan block. An unthinned tree produced 1005 pounds of fruit and the fruit from this tree showed 61.55 per cent. with sufficient red color to meet the U. S. standard for Fancy. The apples on an adjoining tree were thinned to 14 inches apart so that the tree bore only 623 pounds of fruit. There were 87.27 per cent of them Fancy in color. Another pair of trees were each thinned to 10 inches apart. One tree bore 840 pounds and the other 394 pounds. The one with the heavier crop had 68.17 per cent. of them Fancy and the other one 93.58 per cent. Fancy. Many other data could be cited along this line which support the idea that a limitation of sugars, however it is brought about, is likely to result in a lack of red color even though the amount of sunlight is in no way limiting.

It is also noted that fruit is likely to be lacking in good red color in a season of excessive droughth. Surely in such a season there is plenty of sunlight, but some other requirement is lacking. Both the overloaded and the excessively dry tree produce fruit that is low in sugar.

Light as a Factor in Color

For many years horticulturists were likely to say that red color was due to the exposure of the fruit to sunlight and as evidence it was pointed out that shaded fruit was poor in color. There is so much truth in that statement that it is not at all strange that a more thorough analysis was so slow in coming. Red color in apple, pear and peach requires presence of sunlight on the fruit for there

is no increase in storage. On the other hand the strawberry, cherry, blackberry, and grape will develop anthocyanin without the presence of light.

In experiments in which apples were covered with black bags thru which no light was transmitted no red color developed except on Williams Favorite. Furthermore it has been shown that it is the blue end of the spectrum which is responsible for the development of the red color. Magness detached apples from the tree after they were developed but uncolored and placed some under glass which screens out the ultra violet rays and a sample was exposed to direct sunlight. The following condensed table shows the great reduction in red color after twelve days when the violet rays were screened out of the light reaching the apples.

TABLE II

Color Development of Detached Apples Under Glass and in Direct Sunlight

After Magness

Percentage of Solid Red Color

Variety	When Started		After 5 Days		After 12 Days	
	Under Glass	Full Sunlight	Under Glass	Full Sunlight	Under Glass	Full Sunlight
Jonathan	6.8	8.6	10.5	37.7	44.0	96.0
Delicious	4.5	5.4	5.6	24.2	17.3	74.0
Roman Beauty	2.5	2.0	4.0	8.0	9.3	36.3

He states that color develops only ¼ as fast under glass as in direct sunlight. In this connection it should be remembered that much of the ultra-violet rays are screened out of the light at low altitudes, by dust, smoke, and other particles. At high altitudes this is not true and colors are known to be much higher under such conditions.

Therefore, light is an indispensible factor in the development of color pigments in the apple, but only after there is a development and accumulation of certain sugar products.

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Therefore, light is an indispensible factor in the development of color pigments in the apple, but only after there is a development and accumulation of certain sugar products.

Relation of Cool Weather to Color

It is a common experience to see fruit turn red when the cool nights of autumn arrive and the statement is commonly made that cold weather produces red color. However, experiments in which fruit was placed in a low temperature at night and exposed to sun during the day time did not result in near so good color as fruit held at 70° instead of at 32° F. Despite this fact experience would indicate that high color and cool weather are correlated.

Effect of Fertilizers on Color

That applications of nitrogen or excessive cultivation frequently reduce color is well known to the experienced orchardist. The explanation should be clear from the discussion earlier in this paper. As a result of denser foliage and reduction in reserve carbohydrates the fruits develop little color. Such apples are much more prone to scald in storage than well colored fruit, although this trouble can be greatly reduced by wrapping in oiled papers.

The chief question which is raised, however, is as to the value of potash and phosphorus in producing a better color. This question has been under discussion and experiment for many years and somewhat contradictory results are reported. Most of the data offered so far show no advantage to color in the use of a complete fertilizer. Of course if all nitrogen is withheld the growth and yield are likely to be markedly reduced and the color improved but that is a poor solution of the problem. It becomes a question of a compromise between the amount of growth and yield desired on the one hand and the color on the other.

Thinning as an Aid

As stated before it is to be expected that usually thinning the crop will increase the color, both of apples and peaches. The physiological explanation would seem to be

the same as that already given, namely an increase in the storage sugars for the remaining fruits. This would seem to be a better postulate than an increase in exposure to sunlight. Whatever the explanation, it is a good practice in solving the color problem as well as for other reasons.

Summary

By way of summary then, we must say there is no short-cut formula that will guarantee high color. Avoidance of excess nitrogen or other practices that stimulate growth, thinning, a moderate pruning practice, avoidance of caustic sprays that russet the fruit, and finally the use of red varieties, particularly red sports or strains of the old varieties, all contribute to a solution of the color problem.

MR. KLEIN: I would like to ask Professor Gourley whether these red sports that he speaks of act practically the same under different soil conditions, that is, in one state or one section of the state as another.

PROFESSOR GOURLEY: Well, I wish I could answer that question more fully than I can, because there is only one way we can find that out, and that is to try it extensively in many different sections. I would say this—as far as the Red Rome are concerned, I know of no place where they have been tried where they haven't given pretty much the same result that we have had. The tree is almost the same type as the Rome, and the fruit proved to be redder in color. You can have Red Rome on a tree that has not been pruned, and up in under the branches—they are probably starved because they go together—they do not get a very good color, but in the main under any kind of reasonable conditions where I have seen, it has been better than the old strain on color, although many of the old strains under favorable conditions will color up very well, too.

Where I have seen the Red Duchess, it seemed to me that holds with them; I haven't seen so very much yet of the Red Delicious. The one or two cases that I have seen

did not look very good. Others made no complaint in regard to that. I have seen the Red Spy grown in Quebec, and I think up there they certainly feel that the red strains are superior to the old strain.

MR. D. GOLD MILLER: I am interested in this matter of color. We have been fighting now for four or five years for color. I have a picture in my pocket here of a pile of 700,000 bushels of apples.

That pile of apples would not have been there had it not been for lack of color, most of them. I think if there is anything we do need it is a red apple that is red. I took some grafting wood from the Starking and grafted it on another tree. This summer there were 29 apples on it, and the 1st day of September they were red enough for U. S. No. 1 in color.

PROFESSOR GOURLEY: How were they on size?

MR. D. GOLD MILLER: They ran about as good as the others. As far as color is concerned, the Starking is a red apple all the way through. I have no Gallia Beauty yet. My friend Mr. Leatherman had some. If you can grow them like that, I want the apple.

MR. TOWSON: I think before we go on we ought to say something about the wonderful addresses we have had from Professor Gourley and Professor Heinicke. I think these addresses are outstanding, and all of us appreciate them very much. I certainly enjoyed them myself. I move that we give a vote of thanks to the speakers.

The motion was seconded by Mr. Canby and carried unanimously.

PRESIDENT MCCAIN: Dr. J. R. Magness, Pomologist, U. S. Department of Agriculture, Washington, D. C., will talk on, "Lessons Which We Might Learn From Fruit Production Methods in the State of Washington." Dr. Magness.

DR. J. R. MAGNESS: Mr. President and Members of the Horticultural Society: I am not going to try to discuss lessons for Maryland horticulturists from the fruit growing industry of Washington. I might get in pretty hot

water if I tried to do that. The conditions are so different in the different sections of the country that I am going to point out as well as I can certain of the salient features in the Washington fruit industry and let you largely draw your own conclusions as to how closely they fit Maryland conditions.

I know that the growing conditions are so different particularly since the whole industry there is based on irrigated horticulture, and here you depend on natural rainfall, that I realize many of the practices which proved very successful there could not be taken over under eastern growing conditions.

In order to get a background of this Washington fruit growing, I am going to give some figures to give you some idea of the economic status of the industry out there, particularly the cost of production per acre and per box in order that you may have those figures for comparison with your own conditions. These figures which I will give you are based on averages, on the average cost record on 80 typical apple orchards in the Wanatchee district of Washington. That district, as most of you know, is almost solidly planted to apples and represents an annual production of approximately 20,000 carloads.

These eighty orchards are not the best; neither are they the worst. I would say that on the whole, they are perhaps slightly above the average. These figures are for the two years of 1926 and 1927, and they have been gathered by the Farm Management Department of the State College at Washington.

First of all I want to give you the average yields obtained in these eighty orchards during these two years, because, of course, the yield is basic to the cost on a unit method. The average yield that these orchards gave in 1926 was 489 packed boxes per acre. That, as I say, was a little bit above the yield of the district as a whole. I think the whole district that year averaged about 450 packed boxes per acre.

During 1927, the year following, the average yield was 466 boxes per acre on practically these same orchards. I

want to give you those figures as an indication of the uniformity of yield. I might say, if we had the figures for 1928 it would be about 500 boxes per acre, because the 1928 crop was a little bit heavier on the whole than that of either of the two preceding years. This year it would perhaps be a little less, down in the neighborhood of 425 to 450 boxes per acre.

With this production, I would like to give you some indication of the costs involved. First of all, the land investment in these orchards represents $1220.00 per acre for land. If we figure 6 per cent. interest on that land investment, (this is the capital investment) it would be approximately $73.00 per acre per year as an interest charge on their land investment. The equipment investment is $137.00 per acre. That, of course, covers the orchard equipment, spraying equipment, generally stationary spray plants, boxes, packing equipment, pruning tools, everything of that kind. I believe in these figures they allowed for a 15 per cent. depreciation in equipment. But if we figure on interest, depreciation, repairs on equipment, that makes an annual charge of $52.00 per acre for depreciation, repair, and equipment. These are actual figures as obtained from these 80 fruit growers.

The building investment was $127.00 per acre on these orchards. The irrigation investment was $36.00 per acre, the cost of the irrigation system. That does not pay for the water, it simply represents the overhead investment in the ditches and flumes, etc., for the irrigation system.

The interest and depreciation on that would be $7.00 per acre, and the interest and depreciation on the buildings was $15.50. I might say that I have smoothed out these figures a little bit rather than carry the exact cents for the different items.

Taxes and water and crop insurance represent an annual charge of $33.00 per acre. I might say there that the cost of water and taxes runs more or less uniformly over the district. If a man has to pay a high charge for water, his taxes are lower, because the inherent value of his land without water on it is less. So that the total of

taxes and water is somewhat uniform over the district and generally runs from $30.00 to $35.00 per acre.

If we total these figures, then the total capital investment is $1520.00 per acre, and the total annual cost, overhead, is $180.50.

Just one more point. That charge of $180.00 per acre overhead is absolutely independent of the quantities of fruit on the trees. There isn't a charge in there that varies with the amount of fruit produced.

How about the cultural costs? I wouldn't try to give these figures in too much detail, and yet, I think that some of them will be of interest to you. However, before giving that I would like to give you one more figure. I gave you these prices on a per acre basis. If we put that on a per box basis it would amount to .38 per box on the average product for the two years. So that while the cost per acre is very high, the cost per box does not run up so much.

Now the cultural material costs: The biggest item is for sprays and spray materials. These orchards spent for spray materials $21.50 per acre. That is for cover sprays, and is not for applications, simply for materials. Fertilizers and manure, $7.50 per acre. I think that is a particularly pertinent figure in view of the fact that all these orchards are in permanent cover crops. Miscellaneous expenditures, 70 cents per acre. That makes a total cultural material cost of practically $30.00 per acre.

I think the labor cost will be particularly interesting to you. The per acre cost for pruning and brush disposal was $25.50. Cultivation and ditching, $3.75. There is very little cultivation done in these orchards. Cultivation consists simply of discing the cover crop in the spring and laying out the ditches for irrigation systems. The irrigation labor cost is $17.50 per acre per year. That added to the cost of the water makes the total irrigation bill approximately $50.00 per year.

Labor for spraying is $14.00 per acre. Here is a particularly interesting item—the labor for thinning, $26.50 per acre as the average. I might say I know of individual

cases where the thinning bill has run as high as $100.00 per acre for a single season. But this $26.50 is the average figure for these orchards for the two years. Miscellaneous labor, $12.25. Miscellaneous includes general work not covered in any of these itemized statements.

The total labor cost is about $99.50 per acre. The total material cost is approximately $30.00 per acre.

There is relatively little variation in cost depending upon the amount of crop on the tree. There is a total cultural cost here of approximately $130.00 per acre. It is true that with a little crop your thinning bill would run a little bit less, but your spraying bill would be about the same, your irrigation bill would be the same, your irrigation bill would be exactly the same, so that there is relatively little variation in cost in production here depending upon the amount of fruit per acre.

The total cost up to harvest, figuring 6 per cent. interest on investment, averaged $309.00 per acre in these orchards.

There is a good deal of question among farm management people as to whether interest on investment should be included in cost. If the interest on investment is not figured, then the cost becomes $241.00 per acre; $309.00 including 6 per cent. interest on the investment. Considering the average yield that was obtained, that runs the total cost up to harvest in these eighty orchards, including interest on investment, at 66 cents per box. If we figure the cost without interest on the investment, it is 50 and a half cents per box.

There is just one point that I want to make there. In spite of the very high production costs of over $300.00 per acre, their cost per box is probably not much greater than most of your costs, perhaps less than many of your costs, primarily because of the yield figure of almost 500 boxes per acre per year. You can easily see that if that production dropped down to 300 boxes per year, their costs up to harvest would be approximately $1.00 a box. On the other hand, if they boost that production up to 700 or

800 boxes per year, their cost per box would be down to 40 to 45 cents.

Under their growing conditions there there is relatively little variation in the cost up to harvest time. The only possible way that they can grow apples in competition with eastern districts is to hold their yields up around 500 boxes per acre. It is the generally accepted principle in the industry out there that unless they can get around 500 boxes per acre, they can't expect to make money growing apples.

In regard to the harvesting costs, I will simply give you the gross figures. The harvesting costs and packing, of course, depends almost entirely upon the tonnage, that is, the cost there is not fixed per acre, but it is more or less fixed per box. The average costs on these 80 farms for two years to pick the fruit, haul it to the packing house, pack it out, was 53.7 per box. That includes boxes, paper, grading and cleaning of the fruit; the whole operation.

If we total these figures, then we find a total cost per packed box of $1.07, figuring no interest on the land; or $1.23 including interest on the land.

We might raise the question, how did these 80 orchardists come out during those two years? As you know, 1926 was a very big year, 1927 was a short crop with relatively high prices. In 1926 the fruit sold for an average of $1.00 per box, less than a dollar and one cent, so there was a net loss on these eighty orchards of approximately $88.00 per acre in 1926. In 1927 the fruit sold on the average for $1.77 a box, so that there was a net profit above interest and above wages for the man and for his family of $227.00 per acre. The average of the two years, of course, would show a profit of about $75.00 per acre per year after paying interest, depreciation, and wages. I might say I believe 1926 is the only year in the last five where they actually failed to make interest on their investment. In 1928, last year, most of the growers made some money, and this year, of course, is a repetition or almost a repetition of 1927 with very good profits.

With that background I am going to review some of the orchard practices. These orchards vary all the way from four to eighty acres. Eighty acres is a large orchard in that district, and purposely the orchards were taken of all sizes. I might say in that connection, that the cost per box was the least in orchards of about fifteen acres in that district. In the smaller orchards and in the larger orchards the cost per box was higher, and the minimum cost per box was about fifteen acre orchards. In other words, apparently the largest orchard that might be considered a one man orchard or one family orchard seemed to give the least cost per box. That does not mean that the total income would not have been greater on larger orchards, of course.

Are there any questions at this point?

MR. FRED R. SLOAN: Were they packed in a community plant?

DR. MAGNESS: Some were packed in the community plant and some on the farm. The figures that were given were the average figures. I might say in general, where an orchardist is a fairly large operator, they find that they can pack their fruit a little bit cheaper themselves. For a ten to fifteen acre unit, however, it is questionable whether it is the best economics for the orchardist to pack his own fruit, although there is a good deal of difference of opinion. I would say approximately half of this is community packed; the rest of it was packed at the orchard.

As to the growing conditions—I mentioned the fact that all of these orchards are irrigated. A good irrigation practice generally means getting over the orchard and watering it about every two weeks. In these districts in the northwest the individual grower gets a continuous small supply of water contrary to certain other irrigation systems where they get a large supply every ten days or two weeks. These men get a continuous small supply of water, so that they have water running in their orchards all the time. But they simply work from one side of the orchard to the other, letting the water run through their

furrows, for about 24 hours, then shifting to a new set of furrows, figuring on getting over the orchard about once in two weeks.

I mentioned the fact that practically all of the orchards are in permanent cover crops. Alfalfa is used almost exclusively, although during the past few years there has been considerable enthusiasm for biennial sweet clover. Sweet clover seems to be particularly valuable in opening up rather impervious soils. Some times they get trouble in getting the water down into the soil, and sweet clover being a plant which lives only two years, is particularly fine for opening up impervious soil. The plant grows, makes a big root, dies, and the root decomposes, and you have got organic matter down through the soil, whereas, with alfalfa your plant lives for several years and you don't get the full effect of the cover crop in opening up the soil until the plant dies and the roots decay out. From that point of view at least, sweet clover seems to have considerable advantage. Also, under conditions out there it will reseed itself fairly well, so that it isn't any more difficult or not much more difficult to handle than alfalfa.

It does have some other undesirable features. It tends to die down in the fall, and there is considerable fire hazard with this dense mass of dry vegetation in the orchard at the time the fruit is being harvested.

MR. SLOAN: Is that run over with the disc?

DR. MAGNESS: Yes, they tend to disc it in, although occasionally they just drag it down, and if they drag it down in the fall it does mean considerable fire hazard in the orchard. There have been a number of cases of being burned over.

MR. SLOAN: Wouldn't it be better to cut it rather than let it die?

DR. MAGNESS: There is practically no cutting in the State of Washington, primarily because there seems to be little gained by doing it. Most of the orchardists do not have mowing machines, and they simply let it mat down and disc it in the spring or in the fall.

Now just a word in regard to the effects of cover crops in the orchards. Up until about 12 years ago the orchards of the northwest were clean cultivated. At that time the orchards were all reclaimed desert land. There had been relatively little vegetation on them before they were put in orchards. There was little organic matter in the soil. After a few years the orchards began to go to pieces badly. A condition termed apple rosette became very pronounced in the orchard where the foliage, instead of being large and well developed would be clusters of little bits of narrow leaves, and the production in those orchards and in those trees was falling off very rapidly.

At that time the production in the best of the orchards was down to around 250 or 300 boxes per acre, and instead of increasing as the trees got older, it was dropning off; the sizes were dropping off. With the use of alfalfa, however, the orchards began to come back so that at the present time production per acre is at the highest level that it has ever been, and I think the condition of the orchards on the whole during the past two or three years is also the best that it has ever been. Commercially, rosette has been almost absolutely controlled through the use of cover crops and the building up of the organic matter content of the soil.

MR. E. L. GOLDSBOROUGH: Have you the figures for production?

DR. MAGNESS: I can't give you that exactly. I would say that the culls on the average would probably represent about six to eight per cent., and you would add about that figure to get the total production. That is probably about the average figure for these 80 orchards, because they represent pretty close to average conditions.

MR. R. H. STUBBS: How many trees to an acre?

DR. MAGNESS: Most of the orchards at the present time are running about 70 trees per acre. The orchards were planted a good deal closer than that; planted about 100 trees per acre; in some cases even more than that. But during the past few years there has been a definite orchard thinning program, so that I would estimate that

at the present time the average will be from 60 to 70 trees per acre, although there are orchards down to 50 and there are other orchards that are still up pretty close to 100.

I mentioned the fertilizer bill being around $7.50 per acre. I might say that in the northwest just as in the eastern district, the question of orchard fertilizers has been one that has been very much agitated. There has been a great deal of difference of opinion as to what fertilizer should be used. On the whole, nitrogen primarily the sulphate of ammonia is the basic fertilizer added to the cover crop or added to the cover crop program.

The reason they use sulphate of ammonia primarily rather than nitrate of soda in that section is because the soils all tend to be slightly on the alkaline side rather than on the acid side as in most of your land, and sulphate of ammonia, leaving an acid residue in the soil, has been used very largely rather than nitrate of soda.

That does not mean that under your conditions the nitrate of soda won't give better results. As a matter of fact, temporarily it gives fully as good results in the northwest, but there has been a feeling that as a permanent program the form of nitrogen leaving the acid residue was the preferable one to use.

The one outstanding thing that seems to be essential to the maintaining of the type of production that the orchardist in the northwest must get if he is going to stay in the business is a good vigorous annual growth in his trees. Unless the terminals of the branches are making from 10 to 14 inches growth per year, we are pretty certain that the orchard is not at its maximum production. As has been mentioned here a good many times today, the amount of fruit that can be manufactured in a year is absolutely dependent upon the leaf surface. The amount of foliage which you have in a tree is dependent upon the amount of growth that that tree makes, not only on the terminals, but on the spurs all through the tree. In general, there is an association between the growth of spurs and the growth of terminals, so that un-

less the tree is in a sufficiently vigorous condition and is making a terminal growth of 10 to 14 inches per year, there is a very definite feeling that it isn't developing the leaf surface to give maximum production. Consequently, the whole program of fertilizing, of cover crops, of pruning, is tending to concentrate on keeping that vigorous growth condition in the trees.

I know that you will all be interested in the question of pruning, and yet, I can't tell you how the northwestern orchardist prunes his trees simply because there are almost as many different systems of pruning, as there are orchardists. Some of the very successful orchardists in the district have made the statement that the fruit growers in the State of Washington would be better off if they would throw every pruning tool in the river. That is one extreme view. The other extreme view is to give a very heavy detailed annual pruning. Probably the truth lies somewhere between the two points of view.

We had the feeling in our experience out there that if the growth of the tree could be maintained through fertile soil, through a cover crop and fertilizer program to maintain growth with a minimum of pruning, then the minimum of pruning that could be given would give the maximum yields. On the other hand, if the soil was not sufficiently rich, if the water supply was short, if the fertilizer program was not such as to maintain growth, without considerable annual pruning, then the pruning seemed to be necessary to get the best development of the fruit. Consequently, we have felt that the pruning program for out there depends very largely on the growing conditions of the individual grower. If a man had light soil which was not particularly retentive of moisture, if he was short of irrigation water as a good many orchards are, he would have to practice a heavier annual pruning than he would if he had a deep, rententive soil and plenty of water. So that the pruning program is intimately associated with the fertilizer, and the irrigation program.

MR. TOWSON: How are the apples borne out there—on the outside like they are here?

DR. MAGNESS: To a considerable extent, yes. That is, there are some apples down through the tree unless the trees are allowed to become too dense, but probably 90 per cent. of the fruit is over the outside.

MR. TOWSON: Isn't it true that the majority of those trees out there do not look like our apple trees? I think in a great many instances they look more like forest trees, don't they?

DR. MAGNESS: I think it is true. They have made perhaps a greater effort to keep the trees down, and particularly to level them so they have room enough to come down naturally with the crops that they bear. I think on the whole there is undoubtedly heavier pruning out there on the average than in the average eastern orchard. They prune to get growth. I should say they get the growth, and if they have to prune to do it, they prune. If they can get the growth with a minimum of pruning or with very little pruning, particularly a little heading back, they get along with the heading back.

MR. NEWCOMER: Is their soil for growing apples naturally richer than it is in the east acre for acre in nitrogen, phosphorus, and potash?

DR. MAGNESS: There are all kinds of soils in the northwest just as there are in the east. The analysis of the virgin soil out there shows that it is very low in nitrogen and fairly high in phosphorus and potash. I would say on the average, it is a little higher in phosphorus and potash than eastern soil, particularly phosphorus, and definitely lower in nitrogen. That is the reason for the legume cover crop, and nitrogen has been the all important question in western apple production.

QUESTION: How about evaporating apples with an electrical process? Does it pay to evaporate apples?

DR. MAGNESS: That is a marketing question that I couldn't answer. Of course, there are a great many apples dried. That is one of the big outlets for the culls out there. They have not dried anything except culls. Anything that could be marketed in the fresh state has been marketed in that condition.

QUESTION: What is the difference in profit between evaporated and raw apples?

DR. MAGNESS: The evaporators pay generally six to fifteen dollars a ton for culls which they use in their evaporation. Some of the evaporators have gone broke, so at least some years they don't make a great deal of money on it on that basis. On the other hand, the price of dried apples varies about as much as the price of fresh apples.

MR. COHILL: What about poisoning of the mice?

DR. MAGNESS: Poisoning of the mice is a standard orchard operation. There are many orchardists who keep the cover crop away from the trees, particularly in the fall. They clear it away within two or three feet of the trees. They do have considerable mouse injury, and the poisoning of the mice is a very important part of their orchard operations. Otherwise they may find their trees girdled in the spring when the snow leaves.

Now just a few words in regard to thinning. You will notice that the thinning bill here of $26.50 was the highest single orchard operation cost in the whole list of cultural prices. I think that thinning is almost the most important single factor out there in maintaining regularity of production and in getting the size and color of fruit which they feel they must have to make a profit. There is a good deal of conflicting evidence as to how much effect thinning has on regularity of production. I think we have two factors to consider. One is the keeping of the orchard in regular production, and the other is the correcting of a definite alternate bearing condition. Certainly, it is much easier to keep an orchard in regular production than it is to correct a condition after it has definitely become fixed in the alternate bearing habit.

There is absolutely no question in my mind but that the thinning program is one of the greatest factors in maintaining regularity of production in those western orchards. I know that if a Delicious orchard, for instance, is allowed to carry all of the fruit which frequently sets, those trees will not come back with a crop the next year

in the northwest or anywhere else. We saw numerous cases this year of orchards that were allowed to overbear last year which came back with a very light crop.

Most of the varieties which are grown in the northwest are relatively easier to keep in regular production than some of the varieties that you have in this section. The four important varieties out there are Winesap, Rome, Delicious, and Jonathan, and of these varieties three are fairly easy to keep in regular production. On the other hand, varieties such as Spitzenburg, Newtown, Delicious do have a very definite tendency toward alternate bearing, and I feel that the thinning program is a very essential part in the maintenance of regular production in those varieties.

Frequently the orchards are thinned two or three times. It is hard to get enough fruit off the first time over if you have a very heavy crop set on the trees. Generally the first thinning is done in June or the very first of July, and then if it appears that too much fruit has been left on the tree by the middle of July they will be going over the orchard a second time thinning again. As I mentioned, I know of individual cases where they spent $2.00 per tree in thinning. I know one man in whose orchard we did considerable experimental work last year, contracted for the thinning of his Rome Beauties at $2.00 per tree. That seems like a tremendous amount of money to spend for taking fruit off, and yet, they were taking off from four to five thousand apples per tree. It is a case of too many apples, too many bees, perhaps, in that particular case.

MRS. HARRIS: What do they do with the thinnings—let them drop on the ground?

DR. MAGNESS: Yes, unless there are worms present. If they find wormy apples they put these in their pocket and carry them out of the orchard and destroy them.

MR. D. GOLD MILLER: Is that the reason they have such a small amount of culls?

DR. MAGNESS: Yes. In their thinning program, of course, they pick off everything that is marked or blemished at that time.

MR. MILLER: That eliminates the culls?

DR. MAGNESS: It reduces the culls very materially, and of course, reduces the worms, because if they take off a wormy apple at that time it is a first brood worm, and if they get it out of the orchard that is at least one worm that does not come back for the second brood, so that is definitely a part of their practice in the control program so far as worms are concerned.

In regard to irrigation and water supply—I have mentioned how the irrigation is handled.

I want to make one or two statements to corroborate what Professor Gourley has said in regard to color. It is a very definitely accepted principle in orcharding out there that if their orchards get dry, particularly through August and September their fruit will be of poor color. It will take on a dull bronze color rather than the bright red color which is desirable. Some work which we did this summer rather indicated the fundamental cause of that is the lack of functioning of the leaves when the soil gets a little dry. The pores in the leaves through which the carbon dioxide from the air enters, close up, at any time during the day that there is a little vapor deficit in the foliage. Under ideal soil moisture conditions those pores stay open at least until noon out there and the leaves are functioning through eight or ten hours of intense light. If the orchards get a little drier, those pores may close up at six or seven or eight o'clock in the morning and cut down the function of the leaves to that extent. If the leaves fail to function, we get the same condition in the tree that we get from too much fruit on the tree, that is, not enough foliage, not enough manufactured material to carry the fruit through.

Under eastern conditions, of course, you gentlemen generally have no control of the water supply so far as the direct addition of water to the orchard is concerned such as they practice out there. On the other hand, the

organic matter content of the soil is a very vital factor in maintaining water supply, and I think it highly probable that some of the outstanding beneficial effects from increased organic matter is through increased water holding capacity and the allowing of the foliage to function to a greater extent throughout the growing season.

I am going to say a word or two in regard to spray.

I think all of you know that the stationary spray plant out there has come into practically 100 per cent. use. I don't mean to say that all orchards are under stationary spray systems. But practically 100 per cent. of the new equipment that is being bought is of the stationary type. I know of one dealer in Wanatchee last year who told me that during the season he had sold 300 stationary spray plants and had not sold a single portable sprayer, so that gives some idea of the extent to which the stationary spray plant has come in.

MR. LEE ALLEN: Are they putting those in the young orchards?

DR. MAGNESS: Generally they are not putting them in until the orchards come into bearing; about five or six years old.

MR. LEE ALLEN: Are they underground or overground?

DR. MAGNESS: Most of them are going under ground for permanent installation. A good many of them simply lay them on top of the ground where they are not cultivating through the summer, and take them up in the fall. That is frequently practiced for a year or two until they get their exact layout that they want. Then they put them under ground.

The fungous diseases out there are relatively a minor problem. There is about one fungous disease that is important in the State of Washington at least in the apple district, and that is apple mildew. That is a problem when they have rainy weather during May. However, the control has to be on before the problem develops, so it is more or less of an insurance spraying proposition. Apple scab is practically unknown because of the dry atmos-

pheric conditions, and the other fungous diseases are of relatively minor importance.

The big war is on insects, codling moths particularly, aphis to a lesser degree. The codling moth sprays through the summer constitute about 90 per cent. of the spray effort. In the spraying for codling moths there has been a very definite increase of the use of summer oils during the past two or three years—summer oils, not alone, but in combination with arsenate of lead. The combination has given definitely better control than arsenate of lead alone. Oil alone has not given as good results as arsenate of lead alone. But the combination has given better results. There has been a very definite indication of reduction in size of fruit if more than about three applications of oil are applied. But apparently up to three applications of the lighter oil has not given a measurable decrease in the size of fruit and has aided materially in the control program.

MR. TOWSON: Do they use oil for the first codling moth spray?

DR. MAGNESS: They tend to apply oil more in the second spray, although some are using one application at the peak of the first brood and the second application at the peak of the second brood.

Codling moth traps are used very extensively for timing the sprays, and to a lesser extent as a supplementary control measure. A good many growers are putting a trap in every fourth tree as a control measure, and they do catch thousands of moths in that way, using either the cider or fermented malt bait trap. It is almost impossible to determine just how much the use of the trap affects control, but a good many orchardists have been well enough satisfied to use it even at considerable expense.

Just a word in regard to cleaning. All of the fruit that is shipped out of the State of Washington at the present time is either dry cleaned or chemically cleaned. As a rough estimate, I would say that between 60 and 70 per cent. is chemically cleaned, and the rest of it goes through

wipers like many of you are using. That has increased packing cost as nearly as we can determine perhaps two cents a box on the average. But it has resulted in very clean and attractive fruit going out, which the industry feels has resulted in an improvement in their pack, which is worth the effort.

MR. HOOPES: I would like to ask what result they have had in bringing the apples into annual bearing.

DR. MAGNESS: In general, it has not been very difficult to bring them back provided they practice very heavy thinning and have the desired conditions in the trees. I think Delicious is one variety which requires heavier thinning than almost any other variety that we have to maintain regularity in production. We have used it a good deal in studying the foliage area required to develop the fruit. We have found that unless we have 30 or 40 good large leaves per apple on Delicious, they won't grow and at the same time develop fruit buds for the next year.

Jonathan will develop those buds in a good deal less leaf area than Delicious, and it is particularly necessary to thin Delicious heavily if regularity of bearing is to be maintained.

MR. NEWCOMER: In regard to your organic matter, which do you think gives best results, cover crops or alfalfa out there in retaining the moisture?

DR. MAGNESS: Alfalfa or sweet clover are practically the only cover crops that are used. There is practically no use, I might say, of non-leguminous crops except in a good many orchards where the discing of alfalfa has tended to kill it out and possibly then most of the cover crop is weeds. Apparently of all the crops that have been used, sweet clover has been the very best thing for opening up the soil and letting the water penetrate.

I think that any cover crop that is growing in the orchard during the summer season tends to use up water, more water probably than it conserves temporarily. So far as the organic matter itself is concerned from alfalfa or other sources, I don't think anybody has any definite data as to the relative value as water-holding material.

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We have rather assumed that they were all more or less similar.

MR. D. GOLD MILLER: Have you any estimate of what the pipe line system cost?

DR. MAGNESS: In general, for a ten acre tract they figure it can be covered for around $1200.00, which would be a little over $100.00 per acre. On larger tracts the cost per acre has been reduced on the average.

MR. D. GOLD MILLER: We are just finishing now with 180 acres. Last March we put it down on the ground, and we found that it took about ten days for four men and a truck to lay it down in March, and it will take them that long to take it up in July. We did that once. Then we put it up in the trees. We have just finished it now in the trees, the same job, but I suppose it will be about $7,000 for that job on 180 acres.

DR. MAGNESS: I would say that was fairly economical installation.

MR. D. GOLD MILLER: Of course, some of the machinery we had, otherwise it would cost more than that.

DR. MAGNESS: They generally figure around $100.00 per acre for ten to twelve or fourteen acres and less. As the acreage increases, of course, depending partly on the shape of the trees, it costs less. If it is a square orchard it would be cheaper than an oblong orchard.

MR. D. WALKER: In regard to alfalfa, do you only disc that once a year?

DR. MAGNESS: Yes, either in fall or in spring, generally in spring.

MR. R. T. BROWSE: In regard to this question of annual bearing—may I ask you to explain more fully just how thinning would effect annual bearing?

DR. MAGNESS: I think that in horticultural work we have placed too much stress on the time when the first fruit bud differentiation occurs rather than when most of it occurs. Under Washington conditions fruit bud differentiation does not occur until late July or early August, although you can differentiate fruit buds earlier than that. I feel that I can say that with a good deal

of assurance, because we have completely prevented fruit bud formation by treatments given the last of June and we know that fruit buds are not formed all at once but over a period of at least two months duration, so that through July and August over a considerable period is the time of fruit bud differentiation.

It is true, that if your orchard is definitely in alternate bearing it is pretty hard to bring it out by thinning. I think the reason for that is that if every spur or almost every spur is in bloom you generally have a poor foliage in a tree, and with a heavy set, even if you do what seems to be a pretty heavy thinning you are still carrying about all the fruit that your trees will carry.

I believe Dr. Auchter has some data on that which shows that if the fruit was taken off the first of July, it brought the trees back, that is, removing practically all the fruit.

DR. AUCHTER: That was done just after the June drop. We removed all the fruit from the tree.

MR. BROWSE: I would like to establish the difference between the eastern climatic conditions and possibly applying moisture without having anything to do with continuing vegetative growth under irrigation, which, of course, would have a tendency to prolong the differentious period.

DR. MAGNESS: The vegetative growth under Washington conditions is, the terminals are generally formed—by the 1st of July before differentiation takes place. That is, your leaf area is expanded during that first six weeks of growth. Following that, the only way you can increase your leaf area in proportion to your fruit is to take off the fruit.

I don't know whether it is possible by thinning alone to break up the alternate bearing habit, once the trees are definitely doing that. But certainly, under the conditions in Washington, if we let Delicious trees carry all the fruit that they set normally, they will go into the alternate bearing habit. If we follow a consistent heavy

thinning program they don't go into it. We haven't any detailed experimental evidence there.

MR. BROWSE: As far as eastern practice is concerned, can we safely rely in getting them off early?

DR. MAGNESS: Yes, and right along with that I think we must emphasize the foliage condition in the trees. If you are going to keep your trees in regular bearing or if you are going to break them, you have got to build up the foliage in proportion to the fruit. You have got to get the growth conditions as well as the thinning in order to get the leaf area that is necessary to carry the fruit and at the same time, build up reserve to make the fruit bud formation.

DR. AUCHTER: Dr. Magness has shown at the Oregon Experiment Station, that the period of differentiation varies with the vigor of the spur and the location of the bud. That is, strong buds on strong spurs differentiate apparently at a different time, and buds on weak spurs differentiate at different times. So we do have a longer period of fruit bud differentiation than we would be inclined to think following the first work. I think we can pay a good deal of attention to what Dr. Magness says about the removal of more apples in order to leave more leaf area per apple so there will be an accumulation above what the apple needs to make fruit buds for the next year.

DR. MAGNESS: I might say to supplement what Dr. Auchter has said, speaking of removing 40 per cent. of the apples, I know of commercial thinning jobs where 60 per cent. of the apples have been removed on varieties like Rome Beauty. I don't believe that we can determine our thinning program even by saying we will thin to six inches or eight inches or any specific amount. It is going to depend on the foliage condition of the tree. If you have a very heavy foliage in the tree, you can close them in a little bit, and if you have sparse foliage you may have to stretch them out 12 or 14 inches to get good size.

That question of water supply is certainly of vital concern to the tree. I wouldn't want to leave the impression

that I thought that by going out there and thinning your York Imperials that are definitely in the alternate bearing habit that you will bring them back into regular production. I tried to emphasize that thinning is a vital factor in keeping them in annual bearing. After they are once in this very definite alternate bearing habit, it seems to me it would take very excessive and very early thinning to bring them out.

MR. COHILL: You spoke of combination spraying—was that summer sprays?

DR. MAGNESS: Generally in using oil with lead they use about three-quarters of a per cent. of oil.

MR. COHILL: Did they use the combination of oil with lime and sulphur?

DR. MAGNESS: They don't use lime and sulphur in their summer sprays.

MR. COHILL: Did they make as many as three applications?

DR. MAGNESS: Yes.

MR. COHILL: Did they make as many as three applicathe idea of using oil in the summer time is a little difficult.

DR. MAGNESS: I want to say in this connection that oil and lime sulphur do not always go together, and where you are using a lime sulphur summer spray program, you might get a serious reaction from the oils. As a matter of fact, where lime sulphur is used in the spring out there as a mildew spray, they definitely recommend that no oil be used for a period of at least two months after the sulphur has been used.

MR. COHILL: What strength oil would that be—how much oil to the tank?

DR. MAGNESS: They sometimes use a gallon of the commercial oil to a hundred gallons of water. It seems to serve as a spreader, and of course, the oil kills the codling moth eggs it comes in contact with, and one of the outstanding merits of it is reducing the number of stings which, of course, reduces grade of extra fancy or fancy if there are enough of them.

I mentioned that as one interesting thing, as a thing you would not want to take on without passing through the same experimental program they did there for several years.

MR. COHILL: Was there any burning of the foliage?

DR. MAGNESS: There has not been burning to the foliage except during extremely hot weather. If the temperature goes above 95 oils are very likely to burn.

MR. COHILL: There is a danger of rusting?

DR. MAGNESS: We haven't had any rusting out there. But it burns the foliage some times and in some cases burns the fruit a little bit. We have had some injury in the west by using dormant oils, that is clean-up oil sprays too late. If we are going to use oil at all as a dormant spray, we use it before the buds are broken enough to show the green leaves. We have had considerable evidence of injury from oil when we use the oil when the buds are breaking open or have broken open.

MR. NEWCOMER: Would it be a good thing for every grower in America to do that and reduce the number of millions of barrels produced in America and get away from the surplus?

DR. MAGNESS: I don't think there is very much question but what particularly during years of heavy apple production we get a premium for the best fruit and there is considerable advantage in not having poor fruit for that season.

DR. CORY: I think it would be unfortunate if we left this discussion without pointing out to our eastern growers that the main problem in the east is the control of the fungous troubles and not the control of the codling moth. The situation is so different in the west where the codling moth is so very serious, that these summer sprays have to be used. In the east where the scab problem is paramount, it is essential that fungicides be used to control the scab, and our pathologists are recommending the lime sulphur for the control of scab. We find, of course, that the summer oils are incompatible with sulphur sprays as you have stated, and therefore, it would be very

dangerous to attempt to use summer sprays following the application of lime sulphur.

In New Jersey the past year in a section where codling moths were almost as serious as in the west, some summer oils were applied, using an oil emulsion with nicotine tannate, to control the second brood of codling moths. Those experiments are still in the developmental stage, and even if they prove good it would not be necessary in the majority of our Maryland orchards where the codling moth rarely runs over five per cent. of the total injury.

PRESIDENT MCCAIN: The meeting is adjourned.

The meeting adjourned at four-thirty o'clock.

TUESDAY EVENING

January 7, 1930

The Third Session convened at seventy-thirty o'clock, President McCain presiding.

PRESIDENT MCCAIN: The meeting will come to order.

The first speaker on the program tonight is Mr. O. I. Snapp of Fort Valley, Georgia, Entomologist in Charge, U. S. Peach Insect Laboratory on "The Present Status of Our Knowledge of Curculio Control." Mr. Snapp:

THE PRESENT STATUS OF OUR KNOWLEDGE OF CURCULIO CONTROL

By O. I. SNAPP, Fort Valley, Georgia

Mr. Chairman, Ladies and Gentlemen:

I am glad that your Chairman did not introduce me to this audience as a man did down in Mississippi. I was addressing a convention similar to this one and on a similar subject, and he introduced me something like this: "Ladies and gentlemen: We have with us tonight a man who is going to talk to us on bugs, and I feel sure he is full of his subject!"

I am not sure that all of you are interested in this subject that has been assigned to me. I have been working

with it a good many years in Georgia, and I am glad to come here to discuss it.

By asking questions during the discussion, you will get more out of me and you will get more out of this meeting, because we can then discuss your individual problems.

I presume 1929 was a wormy peach year for you in Maryland, as it was throughout the South. The curculio infestation was unusually heavy from Virginia throughout the south to Texas. In the State of Georgia, the conditions of which I am more familiar, the infestation this past season was the heaviest since 1920. So if the curculio has been a problem of importance here this past season, you as a group are not the only ones who have suffered.

The insect that was responsible for wormy peaches in Maryland this past year was either the Oriental peach moth or the curculio. In most sections of the South, most of the wormy peaches this past year were due to the curculio. In a number of localities the growers confused the oriental peach moth with that insect, and in a number of localities, the oriental moth was charged with damage that was due to the curculio. So there may have been some confusion up here.

I am not going to attempt to explain the difference between the two insects other than to pass around these few specimens. The oriental moth larva is longer and of a pinkish color with legs, whereas the curculio larva is a legless grub of a creamy-white color, smaller and stockier. You really should not have any trouble in distinguishing between these two larvae on account of the fact that the oriental peach moth larva has legs and is of a pinkish color when full grown.

MR. D. GOLD MILLER: Does the curculio only work on peaches?

MR. SNAPP: Peaches, wild plums, and other stone and pome fruits. There are a great many wild plums throughout the South.

I am not going to dwell very long on the cause of the heavy infestation last year, because that is water over the dam, and we are now interested in a solution of the problem, but I might allude to a few of the causes for the unusual outbreak of the insect.

The general infestation in the South last year was the heaviest since 1920 when you perhaps recall that the heaviest curculio infestation on record was recorded in Georgia. That season none of the peaches ripening after Hiley, were shipped on account of the heavy curculio infestation.

This past year we anticipated another outbreak of the curculio in the South, and called attention to it whenever the opportunity was presented, because with the collapse of the market last year, a great many infested peaches were left in the orchards, and those infested peaches furnished the source for this heavy curculio infestation in 1929. There were many orchards in the South in which entire crops of Elbertas were allowed to drop to the ground with the collapse of the market. Then the weather, the rains during the spring of 1929, interfered with applying the arsenical applications. I understand you had a drought here during the stone-hardening season, but there was considerable rainy weather during the pollination season, and shortly thereafter, and throughout the South there was an unusual amount of rain. As a matter of fact, in Georgia the heaviest rainfall in 50 years was recorded.

Then the mild winter had something to do with it. I understand in the Eastern Shore of Maryland it got down to 9 degrees above zero. In Georgia, our minimum last winter was 23 and four-tenths. We find in curculio hibernation studies that there is an appreciable mortality of the curculio in hibernation when there are dips to 10 to 15 degrees above zero several times during the winter. I will allude to that a little later. Last winter we had no weather cold enough in the Lower South to kill out the curculio, and probably not enough to kill very many in the northern portion of the Southern States.

Then, of course, in many cases the heavy infestation was due to the lack of control measures or to control measures improperly applied. That is always with us every year. The Georgia peach acreage, in my opinion, is now getting back to a point where it would be good business for peach growers in other states to take every possible precaution to raise fruit of high quality.

Just a few words about the history of the curculio. You probably know that it is a native American insect. It is not like the oriental peach moth, San Jose scale, and other insects which have been brought to us. This one was here. It has been written about for 200 years. Perhaps the first reference to the curculio was back in 1736. Its distribution extends from Canada to Florida, and from the Atlantic Seaboard westward to the Rocky Mountains. The Rocky Mountains and desert apparently serve as a barrier to the dissemination of the insect further west.

I have estimated that the loss from this insect will probably reach $10,000,000.00 annually; that is, damage to all fruits.

Before outlining a program of curculio control measures that should be enforced if this insect is to be successfully controlled, I want to discuss with you the life history of the insect, so that you will be in a better position to understand the recommendations that I am going to make. I will pass this box around containing the different stages of this insect—the adults at the top; the larval stage of the insect, with which you are more familiar, in the middle; (that stage matures in the peach), and then at the bottom the pupal stage or resting stage, the stage between the larva and the adult. We find that during some seasons parasites will destroy a great many of the larvae of the curculio.

This curculio passes the winter as an adult beetle in hibernation in woodlands adjoining the orchard, waste places adjoining the orchard, under rubbish in the orchard, on terraced rows and ditch banks that are grown up, and under thick-growing turf such as Bermuda, Johnson, or blue grass.

In the spring of the year with the appearance of the first bloom, the first beetles leave hibernation. By the time the trees are in full bloom the insects are out in numbers. For a week to ten days after they leave hibernation, they feed and mate. Feeding takes place mostly on the calyces or shucks, while they are still green and succulent. After the shucks start to split and the little peaches are exposed, egg deposition begins. The average number of eggs laid by the curculio is 59 per individual. We have a record on 185 females which laid 10,940 eggs. One individual that year deposited 516 eggs.

These eggs hatch on an average of from three to five days. The minimum number of days is two; the maximum, twelve. Immediately upon hatching, the little larvae start working down toward the pit. They live for about two weeks in the peach. In other words, it takes about fourteen days for these worms to become full grown after which they eat their way out of the peach and go into the soil to pass the stage of transformation.

They spend an average of 34 days in the soil. The first week is spent as a worm, or larva, just like the worm in the peach. During that week the worm is preparing a soil cell in which pupation takes place. After that soil cell is prepared, the larva then changes to the pupa and it remains as a delicate, helpless pupa for a period of three weeks, on the average. Then after the adult appears, it will stay in the soil an average of another week before it works its way up out of the soil and escapes.

So it spends about five weeks in the soil as larva, pupa, and adult.

The entire life cycle takes an average of 48 days during the summer and 52 days in the spring. Those records are based on Georgia. It would probably take around 50 days in this latitude.

Now for the program of curculio control measures. Each one of these recommendations is based on the results of experimentation, and we have data to support each one of them. They worked in 1921 following that record outbreak of the curculio in Georgia in 1920. It was remark-

able how this program worked. Of course, it was undertaken as a state-wide campaign. The state was divided into districts for enforcing the campaign, and each district selected a growers committee consisting of the chairman and from five to eight members, and each locality in that district was assigned to one of these committeemen, and it was each mans' duty to see that this program of curculio suppression was enforced.

In 1921 that whole country was cleaned up, and by 1924 the infestation was less than normal. The crop was very good in 1922; 1921 was not so good, but it was a tremendous improvement over 1920. That year Georgia shipped none of the late varieties at all, and it did ship most of them in 1921. By 1924 the curculio was well under control.

Since then this over-production has come along, and the collapse of the markets brought about a good many red figures again. Growers have not been able to get sufficient funds to enforce the control measures, and the insect has become a serious problem again, built up by several years of inefficient control measures or the lack of control measures.

This program of curculio control, if used this year, will work again if it is enforced at the right time. I feel about this program very much like the little darkey felt down in Mississippi about a watermelon. It was during the summer when the members of Congress were home on their vacations, and a Congressman walked up to a store at a crossroads in the Southern part of Mississippi where a merchant had a lot of watermelons on the porch. There was one especially large. There were several little darkies playing around in front of the store. This Congressman said to one of them, "I will make a bet with you about that big melon over there. If you will eat out all the red in that melon I will give you a dollar. But if you don't eat it all, you will have to work the time out here for Mr. Taylor." The darkey looked at the watermelon and said, "Wait a minute." He ran back of the store to a lot where his mother had a melon patch and picked out a melon

the same size as the large one on the porch. He broke it and ate all the red. Then he went back to the store and said, "Marse Weber, I will take that bet." He had tried it and it had worked, so he took him up on his bet.

I feel the same way about this program of curculio control. I know it has worked with an infestation heavier than you have here, and it will work again if it is enforced at the right time.

I am going to discuss some supplementary control measures before saying anything about spraying or dusting. The first of these can be done right now, and is probably as effective as any of the supplementary control measures, and that is a thorough clean-up campaign in and around the orchard. In outlining the life history of the insect I alluded to the fact that this insect hibernates in woodlands and waste places adjoining the orchard, and in rubbish, turf, and neglected places in the orchard. I am not advocating burning forests. That would interfere with the young growth, but there are many waste areas around peach orchards that can be burned over. We find that the insect does not go into those places further than three hundred yards. As a matter of fact, most of the hibernation takes place pretty close to the orchard, but we have found a few individuals as far as three hundred yards.

In burning over a place like that, I would suggest going to that distance and raking back the leaves and trash toward the orchard for six or eight feet so that the fire does not sweep on through the woods. Then light that windrow and let the fire burn toward the orchard. In that way you will not burn over any more than is necessary. Then any ditch, bank or terrace or anything of that kind can be burned over. Of course, we do not advise burning in the orchard unless it is along a ditch bank where the fire can be well controlled and could not possibly get to the trees. Then if there is any close-growing turf in the orchard, it would be well to clean that out to expose the hibernating insects to low temperatures. They are in a semi-dormant condition during the winter. Some

of them would get back into hibernation, but many of them would not get back into hibernation sufficient to withstand zero or five or ten degrees above.

Then any rubbish heaps, pruning piles in the orchard, fence corners, fence rows, roadsides, any place where they can hibernate should be cleaned up. Do as much burning over as possible during the winter.

I might allude to an experiment we conducted in an orchard adjoining a piece of woods. It was a long orchard, I presume half a mile long. We burned half the woods along this orchard. The other half we did not burn. In the spring of the year we jarred the peach trees for five or six rows adjoining this woods and kept a record of the number of curculios we got from each row. The trees adjoining that part of the woods that had been burned over gave just about half as many beetles as we got on the same rows adjoining the strip of woods that had not been burned over. I believe it was something like 56 per cent. more beetles from the rows adjoining the woodland that had not been burned over.

Are there any questions in regard to this clean-up campaign?

MR. MCDONALD: You spoke of not shipping any late peaches in 1920. Were the orchards well sprayed?

MR. SNAPP: There were a few late varieties shipped in 1920, but very few. There were some Hileys, but practically no Elbertas or Georgia Belles. The curculio progeny had accumulated for several seasons.

I might say the growers had become very, very careless in their control measures. In 1920 I saw orchards being sprayed by darkies riding on top of the spray tank. I do not know whether any of you growers have seen that or not, but it was a fact in 1920 and 1919. There were crews of three darkies, the driver and the two who were handling the spray rods riding up on top of the tank and spraying the peach trees as the outfit passed. In some cases the outfit did not even stop at a tree, but just sprinkled the top as it passed by, and in other cases there was no program, no schedule followed. They made the

dusting or spraying fit in with their orchard management, or at a time when they did not have anything else to do. A great many do that. The time comes around to spray and they think that perhaps the peaches will respond more to cultivating just at that time than they will to spraying, and they will cultivate. That is not only in Georgia, it is in other states, too.

MR. LEE ALLEN: You spoke of burning over woodlands. Suppose you had some dead leaves, etc., on the ground but not enough to get a fire over them, especially after they get wet in the fall and winter rains. Would you be justified in raking those up and burning them?

MR. SNAPP: Certainly, it would be well to do that if you could not burn the undergrowth close to the ground. Rake up for 25 or 50 yards. That would probably get most of them. As a great many would cling to the pine needles, leaves, etc., burn that stuff right in the woods, if possible.

I might well refer to some hibernating tests, since that question has come up. We conduct hibernating tests in a cage like you see here in these photographs. Each season we put into these cages different kinds of hibernating materials like those found around the orchards. We put pine needles in one, Spanish moss in another, oak leaves in another, and sticks and trash in another, and then we have one or two with just bare ground. In September we put a thousand beetles in each one of these cages, and then the next spring as the beetles come out of hibernation and fly upon the screen, we capture them and keep a record of the number caught. In that way we obtain data on the mortality during the winter from low temperatures and other factors.

When we have what we call a severe winter, around ten degrees above zero, we find that even under those conditions, Bermuda grass and Johnson grass and Spanish moss will take through 60 to 70 per cent. of the adults, whereas under those same conditions, all will die in the bare ground cages.

This past year we got through over 30 per cent. from ground without anything on it, no protection whatever.

So they will stand below freezing without any protection. Pine needles do not offer very good protection. When we get 60 per cent. through in Bermuda grass, we will get about 35 to 40 per cent. through in pine needles, and about the same number in oak leaves, and a little higher in sticks and bark.

MRS. HARRIS: After you rake the leaves back, would it be possible to spray the ground if you did not want to put fire to it?

MR. SNAPP: If you do not want to burn over, there is something else you can do; you can jar, and that is the next supplementary control measure I am going to discuss. I do not think you will have very good success with spraying anything on the leaves or ground.

They would crawl to some protection, a blade of grass, etc. You may get a few, but the chances are it would not be worth while. I have no data on that.

The second supplementary control measure is one that can be enforced any place in the orchard or near the orchard where you cannot burn. For instance, curculio will hibernate in buildings. You will find a concentration of beetles in the spring of the year around such places as packing sheds, dwellings, barns, etc.

It will surprise you how many of the adults you can capture in the spring of the year by jarring. This may not appear practical to some of you, but it has been in force in Georgia for many years. Mr. Hale jarred 25 years ago, and at the present time one of the largest growers in the State of Georgia jars in lieu of two applications of lead arsenate. I have seen him have as many as ten sets of frames in operation in his orchard at one time, and he does not put on any lead arsenate until two weeks after the shucks fall. In other words, he jars instead of putting on the first two applications.

When the adult curculio is jarred, it feigns death, folds its legs, and falls to the ground. This jarring consists of bumping the trees with a padded pole. We use a pole about ten feet long with a block on the end and this block is padded with a piece of old automobile tire. The

frames are six by twelve feet each, covered with two widths of sheeting three feet wide. We use two frames to each row of trees. In the side of one frame there is a notch ten by ten inches to receive the trunk of the tree. There is a crew of five laborers to each pair of frames, four to carry the frames, that is, two laborers to each frame, and one man to do the jarring.

In Georgia, women and children are used mostly for carrying the frames. The jarring, of course, is always done by a man. These frames are not put down on the ground under each tree as you probably would do if you jarred a few trees with a sheet or something of that kind, but they carry them along, one laborer going in front and the other behind carrying the frame, and twelve or eighteen trees are jarred before the frames are placed on the ground to collect the curculios. That is done early in the morning. The beetles always are less active early in the morning than during other parts of the day. The commercial grower that I alluded to, jars all day but after the sun gets up pretty well (nine or ten o'clock) you perhaps could not jar more than six or eight trees before you would have to put the frame down to collect the curculios, as they become more active at that time.

The curculios can be collected and put in a bucket of kerosene. In Georgia, we usually just mash them on the frame. That is the quickest way, and perhaps the least expensive and does not take much time. I want to recommend this to you around any buildings or adjoining woodlands or waste lands that you do not care to burn over. Start this when the first blooms appear, and keep jarring just as long as you are getting enough beetles to make it worth while. The potential progeny of a female curculio is a sufficient number of larvae to infest 33 crates of peaches, and when you consider the fact that one female may lay 516 eggs you can see how much good can be done by jarring. We have caught as many as 50 curculios from one tree in one morning by this method. I strongly urge you to use this if you have trouble from curculios, especially on the outside rows before the insects become dis-

seminated throughout the orchard. Begin early, and then you will not have to jar but just a few rows adjoining these places where they have hibernated.

MR. ALBERT ALLEN: I would like to ask a question about the frames; suppose you have low peach trees with limbs some eighteen inches from the ground; how are you going to get those?

MR. SNAPP: In that case the laborers in front can turn around and put the frames right under the tree on the ground. It is not much of an operation.

MR. TOWSON: How long does it take for a tree?

MR. SNAPP: Not more than fifteen seconds. It depends on the number of lateral limbs. You do not want to hit them hard enough to tear the bark, just enough to jar them a little.

MR. TOWSON: How high should they be jarred?

MR. SNAPP: About the height of your shoulder. You do not want to jar them too low, because you could not get the vibration up in the twigs.

MR. LEE ALLEN: You spoke of jarring as long as you got a worth while number of beetles. How many would you consider worth while on an average?

MR. SNAPP: I would keep on if I got as many as three to the tree.

MR. LEE ALLEN: How many can they jar a day?

MR. SNAPP: One crew ought to jar about 2500 trees a day if they are working all day.

This next supplementary control measure is one I judge has never been enforced in Maryland, and probably will not be enforced to any extent. It really is more valuable in sections where there are two broods of this insect. I understand from your State Entomologist that you have no evidences of a second brood, but even in latitudes where there is only one generation, this supplementary control measure would be valuable, because it would reduce the source of infestation for the following year. This third supplementary control measure is the collection of infested peach drops. We find that practically all of the peaches that are stung by the curculio before the stone-

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hardening period fall to the ground. It seems as though the work of the larva, even if it is not more than a week old, is a sufficient shock to the peach to cause it to drop. The curculio drop usually comes before the normal May or June drop.

In latitudes where there are two generations, all of the second generation come from the adults that are reared from the worms in the dropped peaches. If you collect the drops in this state, you prevent the development of many curculios that attack the crop the following year. Practically all of the eggs that are deposited before the stone-hardening period, (that begins about four weeks after the shucks come off), fall to the ground in drops. In Georgia we have found that three collections of drops will get about 90 per cent. of all the worms that fall in dropped peaches.

We find that the first collection should be made just about one month after full bloom, followed by two other collections at intervals of five or six days. If you will make those three collections of all of the dropped peaches that fall at that time, you will get over 90 per cent. of the worms that fall in dropped peaches, and prevent the development of the curculios from those worms.

MR. LEE ALLEN: Have you ever thought of using the jarring frames for that, putting them under the tree a day or two early and get these drops that way?

MR. SNAPP: Yes, we have done that, but in order to bring down the infested drops, we bring down some peaches that are not infested, and that probably would not fall if we did not jar the tree.

MR. LEE ALLEN: That would not be so bad if you had a lot and wanted to thin them.

MR. SNAPP: Probably not, if they would fall from the right limbs.

PRESIDENT MCCAIN: How do you destroy the dropped peaches?

MR. SNAPP: We find the drops can be most satisfactorily destroyed by burying. They should be buried at least 18 inches below the surface of the soil, because we

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have been able to get out some curculios that matured when drops were buried 12 inches below the soil. We see no advantage in putting hydrated lime on the drops before filling in the soil. In Georgia, old abandoned wells are used for that purpose. We put them in the wells and put soil on top of them.

Drops can be disposed of by submerging in large bodies of water if you can keep them submerged for several days. Curculio larvae will live on water for about 24 hours, so if you dump them into a river, a great many would float out to the side. You could put them into a sack and drop them into a deep body of water. Where there are just a few you could destroy them by boiling. You may have some success in burning them, but on account of the great amount of water that the drops contain, you must have very hot fires.

MR. LEE ALLEN: How about in harvest time when you are picking out the wormy peaches as you pack—what means of disposal do you take for those?

MR. SNAPP: Well, we either bury those, or in some cases we have been able to handle the infestation by sprinkling paradichlorobenzene or hydrated lime over them.

MR. LEE ALLEN: You mean bury them and then put this over them?

MR. SNAPP: Yes. In Georgia, there are many wells that were used for saw mills, and we just use those for disposal of drops and ripe culls.

MR. LEE ALLEN: Is it generally practiced in a year like this?

MR. SNAPP: Most of the culls were buried this year, as we had a light crop, but all were not buried in 1928.

MR. LEE ALLEN: In other words, you handle the full grown peaches that are infested the same as you would the pick-ups?

MR. SNAPP: Yes, we do when the crop is normal or light, but when we have a heavy crop like we did last year, a great many of them are thrown out.

MR. HANSON: In thinning, what did you do with the thinnings? Do you drop them on the ground?

MR. SNAPP: If they are not infested, I do not know that there is any harmful result from leaving them on the ground.

MR. HANSON: Do you have much brown rot on them?

MR. SNAPP: Not much on the small peaches. Of course, it would be better to thin them into a basket and take them out, but that increases your cost.

We are now working on sprays for disposing of drops. We have not hit on anything yet, but that is one of our projects. In picking up drops, be sure to get the small ones, because they are more likely to be infested than the large ones.

Buckets are used mostly for picking up drops, and these photographs will show you how some of the growers are sold on it. As a matter of fact, I believe 90 per cent. of the acreage in Georgia has the drops picked up. In this particular orchard there were 200 laborers on the pay roll at this time picking up drops. The drops are placed in a wagon and then taken down into a woods where they are put in an old well, after which they are covered with soil.

The next supplementary control measure is one that we attach the least importance to and the one that the grower attaches the most importance to, because it fits in with his program of orchard management, and he does not have to do anything other than what he would do if he did not have the curculio. That is disking under the spread of the trees for the destruction of the pupae.

I told you in outlining the life history of the insect that for three weeks this insect passed a delicate, helpless stage in a cell in the soil. If that cell is broken, the heat and pressure of the soil will bring about the death of the pupae. If the soil cell is broken while the insect is still in the larva or worm stage, it will prepare another cell unless the implement happens to kill it. But after it passes into this pupal or resting stage, if the soil cell is broken, you will cause the death of that individual.

We have conducted some experiments where we have taken boxes of soil and placed several thousand larvae in each and then run our fingers through one box once every week and through another box twice a week, and in another box we would not disturb it. In the box we did not disturb, we usually got a normal emergence, but in the boxes that had been disturbed once or twice a week, we got practically no emergence. So that shows there is something to this. Anything you do to stir up the soil under the trees between June 15th and harvest will help destroy them. Dr. Cory could give you those dates—it is from the beginning of the pupation season until harvest.

QUESTION: How deep do they go into the soil?

MR. SNAPP: We do not find them below three inches.

The fifth supplementary control measure is one that can be enforced only after peach season and one that has been used pretty extensively last year in the South. That is post-harvest dusting for the control of the adults. After the fruit is taken off, we find that they feed on the leaves and to some extent on the buds until they go into hibernation.

With us in Georgia there is a period of about two months between the maturing of the last variety and the time the insect goes into hibernation. We have found through experimentation that you can poison those adults after harvest when they are feeding on the foliage. We suggest that this be done from two to four weeks after the harvest of the peaches. Use 10 per cent. lead arsenate and 90 per cent. hydrated lime. Two weeks later apply a second application. This reduces the source of infestation for the following season.

If you are interested in that supplementary control measure, you can obtain more information on it from U. S. Department of Agriculture Department Bulletin 1205. We advise only dust for post-harvest applications as lead arsenate in the liquid form will cause too much foliage injury, after the regular program of sprays or dusts have been used. The curculio is not going to feed on foliage unless it is green and palatable.

I am going to give you a few words on the comparative effectiveness of spraying and dusting.

All of my discussion so far has been about supplementary control measures—things that should be done in addition to your arsenical treatment. I do not mean to leave the impression that these things can take the place of arsenical treatments, but I am convinced that when the curculio infestation is heavy, the arsenical treatment must be supplemented by these other control measures. It is my opinion that the number of arsenical treatments we can safely give peach trees will not control the curculio satisfactorily during a heavy infestation. If you could use a sufficient number of arsenical applications properly applied, you could probably successfully control it, but that cannot be done, since we are limited in the amount of lead arsenate we can use on peach trees. For that reason, when the infestation is unusually heavy, the arsenical treatments must be supplemented by these other control measures.

A word about spraying and dusting. We have been comparing the effectiveness of these two methods of applying lead arsenate to peach trees since 1917. Each year we have used plats of 200 trees each. This year we tested the effectiveness of these two methods on large blocks of trees, as the growers kept after us to get some data on the effectiveness of these two methods on large blocks. We were able to get an unusually good orchard for this work. It was the most heavily infested orchard we knew of in the Georgia peach belt.

In 1928 none of the fruit was picked. The grower had become careless and left the orchard in the hands of some darkeys. The infestation was so heavy in 1928 he could not sell the fruit. He then allowed all the fruit to fall to the ground, and a couple of weeks after the fruit ripened it was just a mass of slop under the trees, about 5000 of them.

Last spring we went out during full bloom in order to test the infestation, and found an average of 25 beetles per tree. This orchard was completely surrounded by cot-

ton fields, and there was no part of the orchard subjected to greater sources of curculio infestation than another.

We divided this orchard into three blocks of the same size. On one block we used the regular dust schedule just as we recommend it, four applications. We put it on just as near the correct time as we could figure it, and dusted before sunup, the calmest part of the day.

Then on another block we used the regular liquid schedule, four applications, just as we recommend. On the third block we used liquid just like on the second block, except we omitted the first application, the application applied when 75 per cent. of the petals are down, because some of our growers still continue to begin their spraying operation according to the old recommendations; namely, when the shucks have shed.

Then at harvest we picked out ten representative trees in each one of these blocks. We picked up the drops and examined them, and cut open all the harvested fruit from these trees. We found 30.2 per cent. more wormy fruit in the dusted block than in the block that was sprayed with the regular schedule, and we found 184.6 per cent. more brown rot in this dusted block than in the sprayed block. I gave the brown rot figures to show the close interrelation between curculio infestation and brown rot infection.

In the block that was treated with liquid with the first application omitted, we got 30 per cent. more wormy fruit than we did from the block that was sprayed four times. In other words, the dusted block and the block that received three applications of liquid each had 30 per cent. more wormy fruit than the block that received four applications of liquid.

When the curculios come out of hibernation, they spend from a week to ten days feeding and mating. That feeding takes place mostly on the calyces or the shucks, and from these photographs you can see the characteristic curculio feeding marks. The object of the first application, when 75 per cent. of the shucks are down, is to poison the curculios as they are feeding on the calyces and before they

can get to the peach. The peach at that time is still enveloped in the calyx and is protected.

MR. WALKER: What per cent. of arsenic is there in that dust?

MR. SNAPP: We used 5 per cent. because for several seasons we obtained as good curculio control from 5 per cent. as we did from 10 per cent.

MR. TOWSON: What is the spray?

MR. SNAPP: Four pounds of arsenate of lead to the 200-gallon tank.

MR. TOWSON: Any lime?

MR. SNAPP: Lime at the rate of 12 pounds of stone lime or 16 pounds of hydrated lime. Of course, that is high calcium lime containing a low percentage of magnesium oxide.

This first spray, we think, is very valuable in killing off curculios before they can get to the peaches. It is applied when 75 per cent. of the petals are down. If you have a few days of rain, you miss it. Then you had better wait until the shucks come off. That is when we applied the first spray years ago in Georgia. But that is our second application now. Then the third one is applied two weeks after the second, primarily for scab and brown rot. There is no lead arsenate in that application. The last one is applied four weeks before harvest, and should contain both lead arsenate and a fungicide. Use no lead arsenate closer to the ripening period than 4 weeks on account of the possibility of an objectionable arsenical residue. The carrying quality of Georgia peaches has been bettered somewhat by using an application of sulphur dust a week to ten days before harvest. That dust consists of 80 per cent. sulphur, and 20 per cent. hydrated lime.

MR. LEE ALLEN: You mentioned one of your sprays as four weeks before harvest. That would hardly apply to us with just one brood, would it?

MR. SNAPP: Yes. While a great many curculios will die off by the end of the stone-hardening period, some will live over and deposit eggs which will give you wormy

peaches at harvest. There are some of those over-wintering adults that still lay eggs during the ripening and swelling period. Whether you have one or two broods, I should think that last application would be advisable, although it would be well to follow the schedule of your state college along that line.

If you are further interested in the supplementary control measures of the program of spraying or dusting, you can get additional information from U. S. Department of Agriculture Farmers' Bulletin 1557.

PRESIDENT MCCAIN: Thank you, Mr. Snapp, for that address.

I don't know whether all of you have seen San Jose scale or not, but we have a man with us tonight who can tell us how to control it. We are going to hear from Dr. Cory on, "San Jose Scale—A Serious Menace—It Must be Controlled." Dr. Cory.

DR. E. N. CORY: Mr. President and Gentlemen: I am going to show you some San Jose Scale on the screen, because I am sure up until last year very few of you knew what it was. Last year I know many of you became acquainted with what the scale can do.

From 1896 to 1908 the San Jose Scale was a serious menace to Maryland orchards. By 1908 the manufacture of concentrated lime sulphur had become standardized. Shortly thereafter the formulas and methods of home preparation of this solution had reached a stage where fairly uniform solutions could be prepared that gave reasonably effective control.

Infested trees of all kinds were sprayed experimentally and the results were uniformily good in scale control. In fact, so excellent were the results that officials and growers generally ceased to regard the scale as such a menace as to require the destruction of nearby infested trees and osage orange hedges as had been the practice previously. Concentrated lime sulfur became the standard scale remedy and the extension of its use to the control of fungi gave the grower a material that, when properly used, insured his orchard against scale, certain fungi, and

served as a carrier for poisons. The word "insured" is one that has come into general use by growers, who up to the year 1923 made annual applications as insurance against scale regardless of whether visible infestation was present. Subsequent to 1923, the poor income from orchards led many growers to cut expenses whenever possible and many growers took an apathetic attitude towards scale and skipped some annual applications with the result that scale increased in those orchards.

Probably at this point it will be well to recall to mind the salient points in the life and seasonal history to emphasize the great fecundity of the San Jose Scale and to point out how rapidly a few scales can, under favorable conditions, multiply to the point where scale marked apples will occur at picking time.

The scale lives over winter in a partially mature stage. The males emerge as minute two winged insects in May, fertilize the females and die. The females begin to produce young, born alive, about June 1st. Some eggs are deposited, but this is exceptional. These young wander about for a short time and then settle on the new growth, insert their beaks, and begin to suck the sap. The males, are slightly elongate, about half the size of the females, and darker in color as a rule, though some are yellowish. The female is about the size of an ordinary pin head, gray in color, with a central dark nipple surrounded by a yellowish ring. Each female is capable of producing approximately 600 young in a period of six weeks. Assuming an equal ratio of males and females, it has been calculated that a single female is capable of producing the enormous total of 100,000,000 females in four generations. Naturally such an increase is sure to be accompanied by a large amount of fruit infestation.

A moments reflection points to the necessity for annual careful application of an effective dormant spray in order to insure clean fruit and freedom from tree infestations that sap the vitality of the orchard. Lime sulfur, a successful material, serving several other purposes, is available and, therefore, no grower need be afraid of not

controlling scale, if he does thorough work. Oil sprays, if used at 3 per cent. strength will also control scale, but lack the fungicidal effect and are not so successful against the eggs of aphids as either lime sulfur alone or in combination with nicotine.

Results depend, therefore, almost wholly upon annual applications and the thoroughness with which the tree is covered. The high price of labor has led growers to speed up their spraying operations, depending upon the improvements in pressure and quantity of spray material delivered by the new spray outfits to offset the tendency to hurry through the orchard. The spray equipment manufacturers are certainly to be commended for their progress, but the growers will have to realize that even with the best equipment, success depends upon the thoroughness with which the spray men do the work. Good spraying should be rewarded, by a bonus or in some other way, and careless hurried spraying never condoned. Such work vitiates the ultimate success of the program as judged by clean fruit at harvest, and is really money thrown away. Complete coverage is the only kind that pays and, if you will use lime sulfur at the proper strength or a properly compounded oil spray at 3 per cent., you will secure control of the San Jose Scale.

MR. D. GOLD MILLER: We have always been partial to lime sulphur but this year we have ordered some oil for the delayed dormant. Will it have any bad effect on the bloom that is nearly out? What else does it do that lime sulphur will not do?

DR. CORY: It will control red mite, and control the eggs of the aphis just about as well as the lime sulphur, but not quite as well according to the experimental evidence we have. If it is put on late after some of the aphids are hatched, it will control more than lime sulphur will. If you spray at the stage where you have the buds showing, you may get killing of the central bud. I have seen some injury that was serious, but most of it is not serious. If you have properly mixed the oil emulsion you need not fear very much danger from the oil itself. But

your chief trouble may come from failure to control scab. In four out of the five past years Dr. Jehle has found that probably the most important spray in the control of scab has been dormant or delayed dormant application with lime sulphur, and where we have not had that application we have had trouble with scale, because as I say, in four out of the last five years scab spores have been shooting at a time when we were putting on delayed dormant applications.

MR. LEE ALLEN: Would the oil emulsion work all right on peaches for scale?

DR. CORY: Yes, oil emulsion will work all right on peaches.

MR. KLEE: By adding six pounds of soluble sulphur to the oil emulsion, what effect will we get?

DR. CORY: You will probably burn up the buds. Soluble sulphur should not be used on any tissue that is green, because I think it is bound to give you injury. You may get by with it some years without very much injury.

MR. ENGLAR: I have had more faith in lime sulphur than most any other control measure.

DR. CORY: All the experiments with which I am familiar, mainly government experiments, show that the lime sulphur is just as efficient as oil up to 3 per cent. If you have a heavily infested tree, I believe that the use of an oil will give you a better penetration and probably a greater percentage of kill than lime sulphur, but if you have trees that are infested, as most of our Maryland orchards are, somewhere up in the tops, scattering infestation here and there, then I think you get just as good results with lime sulphur as you get with oil, unless you have gone up above 3 per cent.

DR. LANGFORD: Six years ago we ran quite an elaborate series of tests using practically every brand of oil we could obtain on the market, and in comparison with lime sulphur. Lime sulphur in every instance proved as effective as any of the oils at recommended strengths. That was at the time when the middle west and some of the northwest was advocating oils in preference to lime sul-

phur used for the development of resistance to San Jose scale.

DR. CORY: I recall the experiments, and those experiments also included the effect of these spray materials on the eggs or aphids, and the effect of the lime sulphur on the eggs was equal to the effect of the oils; in some cases better. In cases of scale the lime sulphur showed up just as well.

I have on my desk a letter from Dr. Weber, the Entomologist out in Oregon, who said that they had had a meeting in the northwest and decided that the oil sprays should not be applied except in the dormant stage, and that they could use up to 4 per cent. with safety.

MR. ENGLAR: In spraying our orchard in the dormant stage with the oil, and then following that later with the final sulphur spray in the delayed dormant—would we have any advantage in making the two applications, and would we run up against any serious danger in using the two?

DR. CORY: No, if you use the delayed dormant in good weather, I don't think you will have any difficulty there. It simply means an added cost. It has been my experience in Maryland that the progress of buds is very rapid after the time when you cannot go ahead with safety as a dormant spray, and in my judgment it is highly improbable that you will get the stuff on as a delayed dormant over the whole orchard.

MR. D. GOLD MILLER: We are going to depend on the delayed dormant oil spray and I want to know if following it with lime sulphur would do damage.

DR. CORY: Today Dr. Magness was talking about injury from the sulphur and oil combination. That injury comes primarily in hot weather, and applications of lime sulphur over the top of dormant or delayed dormant oil sprays when we have low temperatures seldom if ever gives any injury. What he was talking about was summer applications of white oil emulsion when the temperatures are up to 85, 90, and 95.

MR. ENGLAR: They are advocating the use of them together, lime sulphur with the oil, in the same tank, for the delayed dormant spray.

DR. CORY: I don't know of any experimental evidence that would support that practice, and if you have no thorough going experimental evidence to support your practice you had better give it up.

MR. SAUTER: We have used some oil for the past two years. Previous to that we used lime sulphur, which practically controls aphids.

DR. CORY: I will say this, that the lubricating oil emulsions when they are properly made have been giving uniformly good results, and certain types of miscible oils have given good results, and in some cases they have not.

DR. LANGFORD: During the past year I worked with oils altogether, and I believe I can answer the question in a few words. There are all kinds of oils on the market, but to answer briefly, I will say it depends on the boiling range. Oil with a high boiling range kills much more quickly and effectively than oil with a low boiling range, so if you have oil with a comparatively high boiling range you will get results much better than with oil of a low boiling range. Dr. Darnsworth, of California has shown with scale insects, that oils, light oils or oils with low boiling point are so volatile that when applied to scale or certain other insects they are capable of throwing it off, and a volatile oil will evaporate and you do not get the toxic value.

DR. CORY: You know lime and sulphur will control scale. You know the standard oil emulsion spray will do it if your conditions warrant. I have told you what I think about using the oil. But I do hope that the scale will scare you into doing a thorough job of spraying. That means added equipment; a lot of things that are important in orchard practice. In some cases you have got to add considerable more machines or else you have got to use stationary spray equipment. We have some stationary spray equipment in the state, and I think more are com-

ing, and if you don't get that, you have got to get good outfits, good sprayers, good men, and pay them a bonus for doing good work.

MR. ENGLAR: What about the difference in using the gun or rod?

DR. CORY: At Winchester the sub-committee of the spray program, reported as follows:

"An orchard should be so equipped with spraying facilities that the maximum time required to make one application should not exceed four to six days. Spraying is the best means for controlling orchard insects and diseases"—we compromised: some wanted to leave out dust altogether and some thought we ought to put it in, so we did it this way—"Spraying is the best means for controlling orchard insects and diseases."

I want to support what Mr. Snapp said. In our cage tests this year we put curculio in cages on foliage which had been sprayed and on foliage which had been dusted. The dusted material was 80-10-10, and the sprayed material—I don't recall, I think had three light rains on it before the curculios were caged, and the results were remarkable. The dust did not kill them, and the spraying did kill them.

"The first point is that the minimum size of a spray machine for the average young bearing orchard should be a machine with a 6 to 8 horse power engine capacity, 16 to 17 gallons per minute, half inch spray hose. Rods are preferable to guns under conditions existing in Maryland, West Virginia, and Virginia." Pennsylvania would not agree to it, and they did not want to put in that exception, so we limited it to the three states that did agree to it. A good deal of this is based on the work of Dr. Hough, at Winchester.

"When the average orchard becomes 25 years of age, the minimum size of spray outfit should have an engine 12 to 15 horse power and a capacity of 18 to 25 gallons per minute for spraying.

"Recognizing the value of stationary spraying outfits for large acerages under certain conditions, it is urged in

the four states represented in the Congress, that studies be made in the cost of installation and operation, and the efficiency of existing plants, and that the establishment of experimental plants in small orchards situated on approximately level ground be encouraged."

Maybe that answers some of the questions.

MR. ENGLAR: Does the same treatment for Oriental moth apply? We had curculio injury, and then the moth hibernated in those injuries, something we hadn't had before in our orchard. If we treat that the same as we do San Jose scale, spraying with the same material at the same time will it control that the same as it will other things?

DR. CORY: I don't think it will. You had Oriental peach moth hibernating in curculio scars, hibernating in cocoons in scars made by the curculio? The Oriental peach moth is another story. Stearns worked for a good many years, and feels that the use of hydrated lime in between spray schedules will give a high percentage of fruit free from worms, and in observations in this state over a number of years, we have seen orchards that were heavily sprayed with self boiled lime sulphur, and they kept at it week after week right up to picking time, that had a minimum or Oriental peach moth injury. So far the poison sprays have given very little result, so in answering your question specifically, the treatment for curculio is the poison treatment, but is not going to give you control of your Oriental peach moth. But possibly over-spraying, thorough spraying will give the best results.

MR. ENGLAR: This is apples I am talking about, not peaches.

DR. CORY: Your program for control of curculio on apples would control that.

PRESIDENT MCCAIN: We have a very able man to talk to us on the subject, "Recent Developments in the Control of Spray Injury," Dr. W. S. Hough, of Winchester Field Laboratory, Winchester, Virginia.

RECENT DEVELOPMENTS IN THE CONTROL OF SPRAY INJURY

BY WALTER S. HOUGH, Winchester Research Laboratory of the Va. Experiment Station

When I had the honor of discussing this subject before you a year ago, I attempted to summarize our investigations through the season of 1928. This evening it will be necessary for us to consider nothing more than the work of the past season. Perhaps I should state that from the beginning of our work in 1925 our efforts have been largely confined to orchard spraying experiments for the control of spray injury on Ben Davis apples. Attention has been directed to the injuries following applications of lead arsenate-lime sulphur sprays with the hope that injuries might be reduced by the addition of some corrective substance to the spray solution. Some attention has also been given to a substitute for lead arsenate as well as a substitute for lime sulphur. If we could get a satisfactory substitute for either lead arsenate or lime sulphur or both, our problem of spray injury on apples might be greatly reduced if not solved.

Experience has taught us that all of the blossom-end injury on apples comes from the soluble arsenic in the spray solution, that lead arsenate is not responsible for much of the side russeting on the fruit, that side russeting may be caused by any one factor or any combination of factors such as lime sulphur spray, low temperature, high wind blowing the fruit against the surrounding twigs or vice versa, and certain insects. In 1928 a total of 14.4 per cent. of the fruit on unsprayed trees showed side russeting while in 1929 10.7 per cent. of the unsprayed apples were russeted. As a rule net-like russeting is more prevalent on sprayed fruit and we assume that the increased russeting is due to the sprays applied.

Most of our spray injury occurs in years when we have frequent rains and much humid weather during the spraying season. Fogs and heavy dew, most in evidence in low places, increase spray injury, especially blossom-

end injury. Every time lead arsenate is moistened a small amount of arsenic passes into solution. The longer the solution remains in contact with the apple the more likely it is to cause injury. Recent work at the Oregon Experiment Station indicates that pure water left in the calyx cup for a time takes up malic acid and that the consequent solution can then dissolve increased amounts of arsenic. In this connection it is well to remember that as one increases the quantity of liquid sprayed on the trees he also increases the deposit of spray materials on the fruit as well as the length of time the fruit remains moist.

From what has just been said one can understand why the volume of spray applied to each tree bears an important relation to spray injury. We have been studying the relation of pressure and volume of spray applied to the amount of injury produced. We are beginning to believe that within the range of pressures used (200-400 pounds) the amount of spray applied is more important than the pressure used. Trees which received approximately the same amount of material but at a pressure as low as 200 pounds and as high as 400 pounds showed little variation in the amount of injured fruit. In ordinary orchard spraying, however, increasing the pressure increases the volume of liquid applied and for this reason we must not underestimate the importance of pressure. If we spend one minute each in spraying two trees of the same size, but use 200 pounds pressure for the first tree and 400 pounds for the second, the second tree will receive one-fourth to one-third more spray material depending on the type of equipment used. One would expect more injury to occur on the second tree and that is usually what follows.

Usually blossom-end injury does not begin to appear until six weeks or more after the petal-fall spray has been applied. For the past several seasons this type of injury has been from two to two and a half times more abundant wherever the petal-fall spray was applied in accordance with our regular schedule than where this spray was omitted and only the three cover sprays ap-

plied. But omitting the petal-fall spray has not entirely eliminated arsenical injury at the calyx end of the fruit.

At the present time there is no available, satisfactory substitute for arsenate of lead. Various promising "correctives" to reduce arsenical injury in our present sprays have been tried as follows: calcium caseinate, gypsum or calcium sulphate, lime (hydrated and freshly slacked), ferric oxide and ferrous sulphate. Our first experience with the last two compounds was in 1929. Each of the above mentioned correctives has certain advantages that would appear to recommend it but from the orchard tests to date we can only say that none have been superior to a good grade of hydrated lime, a type of lime known as chemical hydrated lime with an active lime content of around 70 to 72 per cent. There is also available a finely ground quick lime which may be preferred by some. Each of the correctives tends to reduce arsenical injury but none eliminate either the blossom-end burning or side russetting when used in our lead arsenate-lime sulphur sprays. Ferric oxide when used at the strength of 8 pounds in 100 gallons in four sprays (petal-fall and three cover sprays) left a heavy deposit of yellow residue on fruit and foliage which was objectionable at picking time. Furthermore, in this plot there was a marked dropping of fruit in July although no injury was observed on the fruit which might lead one to believe the ferric oxide was was responsible for the drop. Where ferrous sulphate was used at the recommended strength of 1¼ pounds in 100 gallons there was slightly more side russeting than where lime (5 lbs.-100 gal.) was used as the corrective. Aluminum sulphate which has been used in Nova Scotia is not compatible with arsenate of lead and cannot be used with our present spray materials. Under our conditions there has not yet appeared a corrective superior to lime.

But what can we expect from lime? Some growers used lime this past season and without doubt there are some who are disappointed with the results. This year we had varying experiences with lime. In one plot we used 5 pounds of hydrated lime and 4 pounds of arsenate of lead

in 100 gallons in four applications. Blossom-end injury was serious. We also found there was a tendency for blossom-end injury to increase where the amount of lime was reduced to 2 or 3 pounds per 100 gallons of spray, which contained 3 pounds of lead arsenate and 10 quarts of lime sulphur. In seasons when rains are frequent a great deal of lime is washed off and unless large quantities are used we might have insufficient lime remaining on the fruit to prevent injury. According to the chemists, more soluble arsenic may be expected when small or insufficient amounts of lime are used than if none were used. An excess must always be present if we are to expect a reduction in spray injury. Some chemists believe that the carbonation of the lime in the presence of lead arsenate will liberate increased amounts of soluble arsenic on the fruit and foliage. If so, the presence of lime in large quantities should counteract any injurious effects arising from the reactions on the fruit and foliage. In a wet season, as in 1929, the effectiveness of lime may be disappointing but in relatively dry seasons lime has been fairly effective in reducing blossom-end injury. In plots sprayed with 3 pounds of lead arsenate, 10 quarts of lime sulphur and 5 pounds of hydrated lime per 100 gallons 14 to 18 per cent. of the fruit showed side russeting compared to 37 per cent. where lime was omitted. Where 9 pounds of hydrated lime was used 18 per cent. of the fruit showed side russeting. At the present time in Virginia we do not believe it advisable to recommend less than 6 pounds of hydrated lime per 100 gallons of the lead arsenate-lime sulphur spray. We are not yet prepared to say that an amount greater than this will further reduce arsenical injury.

Where 12½ pounds of calcium sulphide was substituted for lime sulphur and used with 3 pounds of lead arsenate in 100 gallons of water for the petal-fall and three cover sprays, the fruit had a smoother finish than in any other plot this year. The proportion of side russeting was 9.6 per cent. and blossom-end injury 2.3 per cent. Where 3 pounds of lime was added to this com-

bination spray side russeting was increased to 25 per cent. but only .7 per cent. of the fruit showed blossom-end injury. While still in the experimental stage, we believe that calcium sulphide may eventually prove to be a satisfactory substitute for lime sulphur in the petal-fall and succeeding sprays wherever spray injury is a problem on apples.

MR. TOWSON: How much did the nine pounds of lime increase your spraying trouble?

DR. HOUGH: It didn't increase the spraying trouble any, because we have a fine grade of spraying lime.

MR. GOLDSBOROUGH: How about ground burned lime? They put it up at these mills, a very finely ground quick lime.

DR. HOUGH: That is very good.

MR. GOLDSBOROUGH: Do you use the same quantity?

DR. HOUGH: Yes.

MR. D. GOLD MILLER: Is there a limit to the temperature when you can use lime sulphur—when the weather is too hot?

DR. HOUGH: Yes, when you get very hot weather, 85 or above, you are going to get that scorching on the sides of the apples.

MR. BROWSE: How did you spray?

DR. HOUGH: We sprayed down one side and right back on the other at the same time we were spraying. It so happened that this year that every day we sprayed there were no high winds.

MR. BROWSE: Didn't you double coat a great many that way?

DR. HOUGH: I expect so—some of the apples were overcoated.

MR. BROWSE: I have done that and wondered whether I have gotten damage from that source.

DR. HOUGH: Of course, our general practice is to spray with the wind, but in our experimental practice we always complete a tree when we spray it, because it simply means double mixing of materials.

MR. ENGLAR: Have you had any experience with dry lime and sulphur in comparison with concentrated lime sulphur?

DR. HOUGH: We have not, but the growers have used that along the side of the liquid lime sulphur and have gotten less injury from the dry lime sulphur.

MR. BROWSE: Is there any injury when the spray has time to dry before it gets so awfully hot?

DR. HOUGH: It has been our observation that if a hot wave comes within a week or ten days after lime sulphur has been applied, you will get scorching on the side of the apples. I have seen it even as long as a month after the last application.

MR. J. K. FUNK: Have you made chemical examinations of the arsenics you have used to determine the amount of soluble arsenic?

DR. HOUGH: No, we are using commercial arsenate of lead. In that connection you might be interested to know that in this year's experiments at the Oregon Experiment Station Dr. Robinson found that in the calyx cup of the apple, water, just pure water takes up malic acid, and this solution dissolves increased amounts of this arsenic and greatly aggravates arsenical injury in the blossom end of the apple. That is why we get more arsenic injury in the low places where we get fog and excessive moisture.

MR. FUNK: A moist climate would have a tendency, perhaps, to increase the effect of the soluble oxide don't you think?

DR. HOUGH: It works out that way.

MR. ENGLAR: We use three pounds to a hundred gallons. Could we increase that?

DR. HOUGH: You increase your amount of injury. We have used four pounds on some of our blocks, and we get more injury where you have that amount of arsenic.

MR. FUNK: Have you noticed any relationship between high temperatures and spray injury?

DR. HOUGH: Not so much, I expect the reason for it is this, that when we have high temperature we always

have low humidity. If we had high temperature and high humidity I think we could get increased injury.

MR. FUNK: Is there a certain amount of calcium sulphide in the lime sulphur?

DR. HOUGH: It goes down through those stages—calcium sulphide doesn't stay calcium sulphide very long on the tree.

DR. CORY: Did you observe any difference in your own experiments between the gun and the rod?

DR. HOUGH: The man who uses the gun and puts a large quantity of material on a small area is getting aggravated injury every time, and if he puts a finely divided spray on and the gun is operated about three-quarters open and is producing a maximum mist and very finely divided spray or a very finely divided spray from a rod, you get less injury. It is easier to do it with the rod than with the gun under ordinary circumstances. Of course, you generally get less injury, because it is easier to put on a fine type of spray with a rod than with a gun, but it can be done with the gun.

MR. D. GOLD MILLER: The smaller or finer the nozzle, the less the danger?

DR. HOUGH: The one-twelfth or one-sixteenth disc produces very fine spray. The smaller the disc the finer your spray.

MR. MILLER: It eliminates some of the danger?

DR. HOUGH: Yes. When you use a one-eighth opening in the gun, and keep that gun turned on at one place you are going to get a very large amount of liquid put on a very small area.

MRS. HARRIS: Speaking of the low part of the orchard, if the low part of the orchard was tiled or ditched to take away the excessive moisture from the roots of the trees, would that help any?

DR. HOUGH: I doubt it. The moisture that seems to do the damage is the moisture that settles on the apple in the way of dew fall. You usually get more fog or more dew in the low places and more moisture, of course. It is

a moisture proposition; arsenical injury comes right back to moisture.

PRESIDENT MCCAIN: Dr. Hough, as long as you continue to bring such information, I believe Maryland will continue to call on you to talk to us.

The meeting adjourned at ten-twenty o'clock.

WEDNESDAY MORNING

January 8, 1930

The Fourth Session convened at nine thirty-five o'clock, President McCain presiding.

PRESIDENT MCCAIN: The meeting will come to order. Our first talk this morning is "Another Year's Experience with Zinc-Lime as a Control for Bacterium Pruni," by Dr. J. W. Roberts, Washington, D. C.

DR. ROBERTS: *Mr. President and Gentlemen:*

We are right here again with the old zinc lime spray. Perhaps some of you remember that last year I said we had been working on this for several years, and we had gotten some pretty good results against bacterial spot, and that we were enlarging our work each year, and that last year we expected a number of growers to use the spray.

I will first report on the use of the spray by some of the growers. In every one of these cases there was no burning when used by growers.

CONTROL OF PEACH BACTERIAL SPOT

BY JOHN W. ROBERTS, Senior Pathologist, LESLIE PIERCE, Principal Scientific Aid and JOHN C. DUNEGAN, Associate Pathologist, Office of Horticultural Crops and Diseases, Bureau of Plant Industry, U. S. Department of Agriculture.

Observations and experiments have shown that peach trees in a high state of vigor on fertile soils are much less susceptible to the bacterial spot disease than those on

light sandy soils or in a state of neglect. Frequently a badly infected orchard will be close to one nearly free from the disease; the former in light soil and the latter in fertile soil or the former neglected and the latter well cared for.

The first step in the control of the disease is to see that the trees are in good growing condition, well pruned, cultivated, fertilized if necessary, and free from borers.

In recent years the writers have been attempting to develop a spray which would control bacterial spot of the peach. In 1928 results were encouraging and have continued so in 1929. During 1929 a number of growers in widely separated sections used the newly developed zinc-lime sprays. In general these growers were satisfied with the results. In some cases no disease developed even on unsprayed trees, so that no results were obtained. When the sprays were used on orchards in a low state of vigor the disease was not controlled. All users seemed to agree on the non-injurious nature of the zinc-lime sprays. When used with arsenate of lead the zinc-lime sprays caused no more injury than the combination of the common sulphur sprays and arsenate of lead. In 1929 the writers conducted experiments near Vincennes, Indiana, in cooperation with the Knox County Horticultural Society and the Purdue Agricultural Experiment Station and in Washington County, Arkansas, in cooperation with the Arkansas Agricultural Experiment Station.

In Indiana the zinc sprays were applied in two orchards in both of which the disease had been very destructive in previous years. In one of these composed of the J. H. Hale variety every fruit of the checks was infected and of the sprayed fruits only 13 per cent. was free from the disease; but in the checks 64 per cent was rendered unmerchantable by the disease, whereas of the sprayed fruit only 11 per cent. was severely injured and therefore unmerchantable. The differences in foliage were very noticeable; the zinc-sprayed plats showed much less defoliation and the leaves were a deeper green. The checks received the usual sulphur dusts. The other orchard in

Indiana consisted of Hales and Elbertas on very thin soil and had been severely injured by the disease in past years. Cover crops and fertilizers together with good pruning and fertilization had within the last two years greatly improved the orchard. Six applications of the zinc sprays at two-week intervals beginning at petal-fall resulted in a striking contrast between the trees sprayed with the zinc-lime sprays and those sprayed with the usual sulphur sprays and which were considered as checks. The former retained many more leaves which were larger and of a deeper green. At picking time examination of the Elbertas showed that less than 1 per cent. of the check fruits was free from the disease and only 14 per cent. of the sprayed; less than 1 per cent. of the latter was unmerchantable on account of the disease, whereas 10 per cent. of the former was unmerchantable. In the case of the Hales, practically all the fruits showed some infection; but only 18 per cent. of the fruit from the zinc-lime plots was unmerchantable because of the disease, whereas 38 per cent. from the check plot was unmerchantable. In Arkansas, large 16-year-old Elbertas received 6 applications of the zinc-lime sprays at intervals of two weeks beginning at petal-fall. Checks received two applications of self-boiled lime-sulphur. None of the plots showed much leaf infection. The zinc-lime sprays reduced the percentage of infected fruit from 73 to 44. Of the picked fruit, 12 per cent. from the checks and 1 per cent. from the zinc-lime plots was unmerchantable because of the disease.

In no case did the zinc-lime sprays cause injury even when six applications at double strength were used. When used with arsenate of lead they caused no more injury and often less than when the common sulphur sprays combined with arsenate of lead were applied to adjacent trees.

No decisive results as to the effectiveness of the sprays in the control of brown-rot and scab were obtained.

Conclusions Concerning the Zinc-Lime Sprays

In the control of peach bacterial spot, the zinc-lime sprays show promise for the following reasons:

1. In experimental trials they have checked the development of peach bacterial spot.

2. They have not injured fruit, foliage, or any other part of the tree and they can be combined with arsenate of lead without greater risk of injury than is usual with sprays containing arsenate of lead.

3. They have stimulated leaf development and possibly fruit development.

4. It is possible that the formation of new cankers may be prevented, and that this combined with the control on other parts and with the stimulation above mentioned may cause the beneficial effects of the spraying to be cumulative, i. e., the sprays may gradually from year to year lessen infection sources and increase the resistance of the trees.

5. The ingredients are cheap and easily obtained.

6. On the other hand, further experimentation is necessary before the sprays are recommended without qualification for the control of bacterial spot. Results in the control of scab and brown-rot with these materials have not been definite enough to warrant conclusions.

Recommendations for the Control of Bacterial Spot

1. Keep the orchard in a high state of vigor through good cultural practices, i. e., pruning, fertilization, cultivation, control of borers, etc.

2. For those who consider the evidence sufficient to warrant spraying, the following is recommended:

(a) Apply one of the zinc-lime sprays at two-week intervals, beginning at petal-fall.

(b) Five to seven applications will probably be necessary.

(c) Take care to cover the fruit and under side of leaves.

In applying the zinc-lime sprays it is necessary to use angle nozzles with small openings, moderately high pressure, at least 200 pounds, and to direct the spray upward in order that the under surface of the leaves may be thoroughly covered. The covering of the under surface of a high percentage of the leaves may be accomplished by spraying from the center outward to the tips of the limbs. Remember that all young parts developing during the season, including fruit, leaves and twigs, may be infected and should be covered.

(d) Arsenate of lead may be used with the zinc sprays.

(e) Do not depend upon the zinc-lime sprays to control scab and brown-rot.

Preparation of the Sprays

Formulas:

(1)	Zinc sulphate	4 lbs.
	Hydrated lime	4 lbs.
	Water	50 gals
(2)	Zinc sulphate	4 lbs.
	Hydrated lime	4 lbs.
	Aluminum sulphate	1 lb.
	Water	50 gals

Although the spray prepared according to formula (2) stays in suspension longer than that prepared according to formula (1), the latter has given equally as good results. Formula (2) is recommended only when agitation is poor or lacking. Zinc sulphate ($Zn\ SO_4\ 7H_20$), sometimes called white vitriol, is a common chemical easily obtained through wholesalers and jobbers. If anhydrous zinc sulphate ($Zn\ SO_4$) is used, only 2¼ pounds is necessary. The hydrated lime should be fresh and of high quality. The grade known as "chemical" is especially recommended. If there is doubt as to the quality of the lime, additional amounts should be used.

Fill the tank nearly full with water. Start the engine to give agitation. Add the zinc sulphate, which, if the lumps

are well broken up, will dissolve in less than five minutes. After it has dissolved, the lime mixed with a small quantity of water to form a thin paste, should then be washed through the strainer into the tank. If aluminum sulphate is used it should be added along with the zinc sulphate. Finish filling the tank, and agitate for five minutes or more before beginning to spray. Use at once.

MR. LEE ALLEN: Last year you spoke of the possibility of the accumulative effect by healing up the cankers on the new wood. Did you notice anything further along that line this year?

DR. ROBERTS: We are not certain about that. One of the hard things about that, is that living cankers are not very numerous. It is awfully hard to spot them and find out what happened to them. It is one of the things that we are working on.

MR. TOWSON: If you were to use a modified Bordo mixture on your peaches, would it control the spot?

DR. ROBERTS: If you could get by without injury it would, but I have never seen Bordo mixture used on peaches in this section of the country without very severe injury, and so I don't recommend it.

PRESIDENT MCCAIN: Our next talk is, "The Importance of Calcium Sulphide in Disease Control," by Dr. R. H. Hurt, of Blacksburg, Virginia.

DR. HURT: The spray materials that we have been using in past years, although very satisfactory in many respects, still have many objectionable features. Lime sulphur, for example, when properly used may be considered one of our best fungicides for the control of apple scab but it is likely to cause injury to fruit and foliage and further it is not so pleasant to use.

Bordeaux mixture is also an excellent fungicide but it is troublesome to make and invariably causes injury to fruit and foliage if cool humid weather follows its application.

The dry-mix sulphur lime spray which has come into general use as a summer fungicide has some very good properties, but it, too, has some undesirable features such

as being hard to wet, having poor sticking qualities, and being a poor carrier of lead arsenate which is due mainly to the lack of sufficient lime.

The first requirement of any spray material is that it must be effective in the control of the diseases for which it is applied. Without this important feature a material is worthless regardless of how safe it may be or how easily it may be to use. The real problem in the improvement of spray materials is to increase the margin of safety and at the same time have materials that will be effective in the control of the diseases for which they are applied.

New spray materials or rather new forms of the old materials, have been introduced quite freely in the last few years. Some of these are very good and some are not so good. Fruit growers should guard against the wholesale use of any new spray material until their local experiment station workers have tested it out and found it to be effective under their conditions.

Calcium sulphide (also called calcium mono-sulphide) is not offered to the fruit growers as a panacea but this material does have certain properties which seem to offer some relief from the standpoint of spray injury as a fungicide and as a corrective for arsenical injury when the materials are used in combination.

There are three features of calcium sulphide which are worthy of consideration. First, it has proved to be a good fungicide under the conditions existing in Virginia during the past four years. Second, it is non-caustic to fruit and foliage; and, third, it is the best carrier of lead arsenate we have used to date.

Calcium sulphide is a fungicide of considerable promise. It has been used in an experimental way in Virginia for the past four years and during 1928 and 1929 was used by several of our best growers with splendid results. We have not recommended the use of this material to the growers except in a small way because we wanted to be reasonably sure of its merits as a fungicide, and furthermore the material has not been available except in

very small quantities and at a fairly high price. The results, however, during our tests at the two field stations and those obtained by growers have pretty clearly demonstrated that this material has some excellent properties as a fungicide and can be used safely throughout the summer season on both apples and peaches.

Description and Preparation of Calcium Sulphide

Calcium sulphide occurs as fine insoluble powder varying in color from a dark to light gray. This material has largely been used by the medical profession as a hair remover and in the treatment of skin diseases, both internally and externally. It is sold to the drug trade under the name of U. S. P. Crude Calcium Sulphide. The reason it is called crude calcium sulphide is because the finished product is not composed of pure calcium sulphide but instead contains from 60 to 70 per cent. calcium sulphide together with some unreduced calcium sulphate and small portions of the reducing agent or agents.

The process involved in the manufacture of calcium sulphide is one of chemical reduction and considerable machinery and cost are necessary for its production. It is, therefore, obvious to the fruit grower that he cannot prepare his own material but will have to buy it of some manufacturing plant. The materials used in the manufacture of calcium sulphide are anhydrous calcium sulphate (gypsum) and powdered coal or coke. The raw materials are quite plentiful and reasonably cheap.

The materials used in our 1926 and 1927 experiments was the U. S. P. crude calcium sulphide. The material used in our work in 1928 and 1929 was a commercial product made at Damascus, Virginia. The commercial material was very much darker in color and coarser in texture than the U. S. P. product but was higher test and gave better results in less quantity than the U. S. P. material.

It is believed that calcium sulphide has been put through sufficient trials by experiment station workers

and growers in Virginia to safely recommend it as a fungicide for apples and peaches when it is properly prepared. The material has never been made on a large commercial scale and there have been many things to be worked out and difficulties to overcome which is generally the case in the production of any new material. It seems certain now that this material can be manufactured commercially to sell at a reasonable price, and there seems to be no doubt but that it will in time replace some of the fungicides now in common use.

Properties of Calcium Sulphide

The data collected throughout all of our tests indicate that calcium sulphide is remarkably free of caustic properties with a high degree of toxicity to fungous diseases which are controlled by sulphur sprays. Calcium sulphide is a sulphur type of spray and is not intended to replace Bordeaux mixture in late summer applications on varieties which are susceptible to bitter rot. The material has the unusual advantage of being applicable to both apples and peaches as a summer fungicide. One of the outstanding features of the material is that it has proved to be an excellent carrier of lead arsenate. It is not definitely known at this time just why this material prevents or checks arsenical injury but it is believed that the water soluble arsenic of the lead arsenate is taken up as an insoluble arsenic sulphide. Tests have shown that it will greatly reduce arsenical injury to peach twigs and foliage if used in all of the lead arsenate applications. Tests have further shown that it will largely prevent arsenical injury on the apple and especially on such varieties as the Ben Davis. There is not the characteristic reaction between calcium sulphide and lead arsenate as there is with lime sulphur and lead arsenate in which soluble arsenic results; therefore, it is not necessary or desirable to use extra lime with calcium sulphide and lead arsenate.

When calcium sulphide is applied to the tree as a spray it undergoes a slow decomposition forming hydrated lime

and calcium hydrosulphide. If a large quantity of hydrated lime is used in combination with calcium sulphide the hydrated lime prevents to a marked degree the dissociation of the material thus partially eliminating its property of taking up water soluble arsenic. The addition of hydrated lime, however, does not seem to interfere with its control value, nor does it seem to increase it.

The ease in which this material may be handled in the orchard is a commendable characteristic. A suspension of it can be easily obtained in water. The required amount is weighed out and placed in the tank and the water added, or it may be washed in by the inflowing water. When lead arsenate is used with calcium sulphide it may be added either before or after the calcium sulphide has been added.

Experimental Results on Disease Control

I shall first call your attention to the excellent conditions under which this material was tested, namely, an incidence of nearly 100 per cent. of apple scab infection in most of our tests, and a heavy infection of peach scab. From data presented later we shall see that this material has good fungicidal properties, for we were able to secure very good disease control under severe conditions of infection, both on apples and peaches.

In our investigations with calcium sulphide we have used two grades of material as previously stated.

Following the good results obtained with the U. S. P. material in 1926 and 1927 we turned our attention to finding some one in the gypsum business who knew how to make the material and also to determine whether it could be made commercially to sell at a reasonable price.

I shall not spend much time in discussing the results of our 1926 and 1927 work with the U. S. P. crude calcium sulphide for this material is entirely too expensive to use as a spray and further it does not contain as much pure calcium sulphide as is possible to obtain. We are particularly interested at this time in the results which

have obtained with the commercial material which is available as a spray.

In our 1926 tests several Winesap apple trees and several Elberta peach trees were sprayed with the U. S. P. material as a complete summer fungicide at the rate of 8 pounds to 50 gallons of water. The apples were sprayed in the pink, petal fall, 3-weeks and 5-weeks applications. Lead arsenate was used in all of the applications except the pink. The peaches were sprayed with the usual shuck application of lead arsenate and lime followed by two applications of calcium sulphide at the rate of 8 pounds to 50 gallons of water.

The number of fruits harvested from these few apple and peach trees were small but the results on both fruit and foliage were good. In the sprayed block of apples there was only a trace of scab and cloud whereas in the check (unsprayed) trees there were 26 per cent. scab and 38.5 per cent. cloud. The results obtained on the peaches were equally as good. In the sprayed block there were 99.5 per cent. clean fruit as compared with only 60 per cent. of clean fruit in the checks.

Spraying experiments with the U. S. P. material were conducted on a much larger scale in 1927 than in 1926. The material was used in the Crozet, Staunton and Winchester sections. At Crozet calcium sulphide replaced lime sulphur in the first three summer sprays and was followed by two applications of Bordeaux mixture. At Staunton it was used as a complete summer fungicide on Winesap and York Imperials. In the Winchester experiments the material was compared with lime sulphur, dry-mix sulphur lime, colloidal copper and Bordeaux mixture on Winesap, Stayman, and Rome Beauty apples.

I shall not go into a detail discussion of the 1927 results. It will suffice to say that the fungicidal value of calcium sulphide in all of our tests was just as good as any of the materials with which it was compared, and much better from the standpoint of causing less fruit and foliage injury and in giving a better finish to the fruit.

Spraying Experiments in 1928 and 1929

During the season of 1928 about 10 tons of calcium sulphide were used at the two field stations and by growers. The material used was the first commercial material made especially for spraying purposes. This was the first season that the material was used as a complete summer fungicide on a large scale. During this season large blocks of Winesap, York Imperial and Ben Davis were sprayed throughout the spraying season. In most of these tests the material was used at the rate of 10 pounds to 50 gallons of water on apples and 6 pounds to 50 gallons of water on peaches. The results of a few of these experiments are as follows:

TABLE 1.—Comparative results obtained by spraying Winesap apples with calcium sulphide and dry-mix in 1928. Data secured at harvest, October 2, Staunton, Va.

Plat	Number fruits in test	Percentage of Fruit					
		Clean	Scab infected	Wormy	Curculio infested	Cloud infected	Spray injured
Calcium sulphide 4 sprays	1,000	97.99	2.50	0.30	0.20	0.10	0.00
Dry-mix 3 sprays, Bordeaux 1 spray	1,000	94.30	5.20	0.20	0.30	0.00	0.00
Check, unsprayed	1,000	0.00	100.00	0.10	0.50	2.60	0.00

TABLE 2.—Comparative results obtained in two plats of Winesap apples, one of which was sprayed with calcium sulphide throughout the season, the other with lime-sulphur followed by Bordeaux mixture in the 5-and 7- weeks applications. Data secured at harvest, October 4, 1928. Crozet, Va.

Plat	Number fruits in test	Percentage of Fruit				
		Clean	Scab infected	Wormy	Curculio infested	Cloud infected
Calcium sulphide 5 sprays	1,000	96.20	3.50	0.20	0.10	0.00
Lime-sulphur 3 sprays, Bordeaux 2 sprays	1,000	87.20	11.20	1.10	0.50	0.00
Check, unsprayed	1,000	0.00	100.00	1.00	1.50	0.50

About 50 Elberta peach trees were sprayed with the commercial calcium sulphide, 6 pounds in 50 gallons of water and a similar block sprayed with dry-mix, 8 pounds in 50 gallons of water. Both plats were sprayed on June 14 and July 20. The results of this experiment are as follows:

TABLE 3.—Comparative results obtained by spraying Elberta Peaches with calcium sulphide, and dry-mix in 1928.

Plat	Percentage of Fruit		
	Clean	Scab infected	Brown rot infected
Calcium sulphide, 2 sprays	89.00	11.00	0.00
Dry-mix, 2 sprays	90.00	10.00	0.00
Check, unsprayed	40.00	60.00	0.00

The first application of calcium sulphide and dry-mix in these plats were made on June 14 which was about 2 weeks late for effective control. Notwithstanding this irregularity in the spray applications, considerable control was effected with both materials.

The most interesting data relative to the spraying of peaches with calcium sulphide were collected from a commercial spray project consisting of about 3,300 trees. This orchard received no other spray except calcium sulphide as a fungicide. The orchard was sprayed 5 times with calcium sulphide, 10 pounds in 50 gallons of water. The calcium sulphide was used in all of the lead arsenate applications instead of hydrated lime and continued for the remaining applications as a fungicide. The crop of peaches was harvested in almost perfect condition. There was not a trace of fruit and foliage injury caused by calcium sulphide and arsenical injury was negligble.

During the past season (1929) about 25 tons of calcium sulphide were used by experimental workers and growers in Virginia. The season offered an excellent opportunity to study certain phases of this material such

as spray injury and its value as a corrective of arsenical injury on apples and peaches.

In our field tests large blocks of Winesap, Ben Davis and York Imperial apples were sprayed with calcium sulphide as a complete summer fungicide in conjunction with lead arsenate. The material was used at the rate of 6¼ pounds in 50 gallons of water. Also large blocks of peaches and two commercial orchards were sprayed with calcium sulphide, 6¼ pounds in 50 gallons of water. It was also substituted for lime in the petal fall and shuck sprays on peaches and continued as a fungicide for the remaining sprays. Where it was substituted for lime in the lead arsenate sprays on peaches it was used at the rate of 6¼ pounds for each pound of lead arsenate.

This was the first season that 6¼ pounds of the material in 50 gallons of water had been used to any extent. This reduced amount was due to the fact that the material was higher test and better quality than had been used in previous experiments.

In the way of results of our 1929 work I want to especially mention two commercial spray projects. One of these was on peaches and the other on apples. The same peach orchard which was sprayed in 1928 with calcium sulphide was again sprayed with this material in 1929. It was used in the lead arsenate sprays as in 1928 and continued as a fungicide for the remaining sprays. The orchard received 5 applications in all. Observations were made in this from time to time during the season. At no time was there any evidence of spray injury caused by calcium sulphide and only a trace of arsenical injury was observed. With the exception of a heavy infestation of Oriental peach moth worms the crop was harvested in almost perfect condition. In connection with this spray project there were a few trees which were not sprayed and their fruit was a total loss due to scab, brown rot and worms.

The apple orchard which was sprayed was of the Winesap variety. About half of this orchard received 5 applications of calcium sulphide as a complete summer sched-

ule at the rate of 6¼ pounds in 50 gallons of water. The other half received lime sulphur 1-40 for the first three early summer applications followed by Bordeaux mixture in the 5- and 7-weeks sprays. The results of counts made at harvest were as follows:

Calcium sulphide as a complete summer fungicide

Disease	Number examined 5000	Percentage of infection
Free		96.50
Scab		trace
Worms		3.50
Cloud		none
Fruit Spot		none
Spray injury on foliage		none
Spray injury on fruit		none

Lime sulphur 1-40, 3 sprays; Bordeaux 2 sprays

Disease	Number examined 5000	Percentage of infection
Free		89.00
Scab		trace
Worms		3.80
Cloud		none
Fruit spot		none
Spray injury on fruit		7.20
Spray injury on foliage		severe

The results which I have given you I think are sufficient to show that calcium sulphide has proved to be an effective fungicide under our conditions on both apples and peaches. I would not recommend this material or any other new material to fruit growers of another State in a large way until their local station workers have tested it out and found it to be all right under their conditions. I can see no reason, however, why calcium sulphide should not give equally as good results in other States as it has in Virginia, and the few results which we have received from other experiment stations indicate that this material is an effective fungicide under a wide range of conditions.

MR. NOFSINGER: How does it correspond in price with lime sulphur?

MR. HURT: It is a little higher right now. I think in time when it is manufactured on a very large scale it will be practically the same price as lime sulphur.

MR. SNAPP: What is the price per pound?

MR. HURT: The price is about six cents a pound, or five cents. It depends on how much you get.

DR. ROBERTS: We used this in Arkansas on apples and in Indiana on peaches. We got no injury on peaches or apples as far as we could see. We used it with arsenate of lead. In the case of apples, we didn't get the material in time to put it on in any of the pre-bloom applications, but we used it in the calyx spray, because we had to go to Bordo mixture later, but in this block in which the calcium mono-sulphide was substituted for lime-sulphide in the calyx spray, our results were equal to those where we used standard lime-sulphur solution. That particular spray in that section of the country is usually the most important spray in the control of apple scab, so we felt encouraged in the use of it and expect to use it in our experiments next year on quite an extensive scale.

MR. HURT: I am very glad to get that information.

MR. BROWSE: May I ask you about residue after applications?

MR. HURT: That is something we are very much interested in. It is a material that breaks down after it is applied and forms a coating very much like dust, that is, it is nearer the appearance of dust on an apple than any material I have ever seen used after the decomposition takes place. We have found it does help us quite considerably in our spray residue situation. It is a material that sticks better than ordinary dry mix, and yet, it wipes off very easily. After the break-down it seems to sit there in a position where it wipes off very easily, and yet, water does not take it off. We think it is going to help us a great deal in our spray residue situation. It does not show up so prominently. It is a dark gray color.

MR. BROWSE: It would seem to me that other than just an occasional demand from the grower would be necessary to get this on the market. Can it not be taken in a

systematic way and encouraged and supported in some official manner? I notice you are ready to take it up in an official recommendation.

MR. HURT: It is a proposition for the gypsum people to handle. Of course, as soon as they find that the results are good, they are going to market it. They are anxious for an outlet for this gypsum, and particularly this anhydrous gypsum which they have no use for, and they are going to get busy and manufacture it on quite a large scale. These people at Damascus are building quite a large plant. We will probably have around three million pounds available this year. With an increased demand, in the course of another year, instead of turning out three million pounds, they will probably turn out ten or fifteen million pounds. I don't think there is any question but that in the course of a year or two there will be several plants, probably in this section of the country, in the middle west, and far west.

MR. TOWSON: How about remaining in suspension?

MR. HURT: It remains in suspension quite well. It is very easy to get wet. It does not matter how you get it in the spray tank. You can dump it in dry and fill the tank with water, or fill the tank up and dump it in the water. It goes right into suspension. If it settles on the bottom of the tank, all you have to do is start the agitator a little and it comes right back.

You don't have occasion to use hydrated lime. You don't need it, because if you have a quantity of hydrated lime tied up with this calcium sulphide, it has no tendency to break down. If you have it all wrapped up in hydrated lime, the chemical change does not go on, or if it does, it is very, very slow and you don't get the same result. I found that was true last year in these experiments.

MR. BROWSE: Just after application, is that material inert?

MR. HURT: No, it isn't, it has fungicidal properties. What happens after that chemical reaction I don't know. But it is a fungicide when you apply it, and as the decomposition goes on it is still a fungicide.

MR. BROWSE: Does that have an effect immediately?

MR. HURT: Yes, it starts in your spray tank, and continues when moisture is present. As a matter of fact, you get your decomposition just when you need it. When it is wet, the decomposition goes on.

MR. LEE ALLEN: What is the name of the company?

MR. HURT: The Calcium Sulphide Corporation, Damascus, Virginia.

MR. ENGLAR: The rust condition was just about the same where you used that as when you used lime sulphur? We are very much interested in the russet situation.

MR. HURT: I believe the russet is due largely to lead arsenate, and as this takes up arsenic it prevents that injury very largely on apples and peaches. That is one of the outstanding properties, that it prevents arsenical injury on peaches.

PRESIDENT MCCAIN: Is there any indication that this material is beneficial in the control of bacterium pruni?

MR. HURT: I have no data on that. I have a block of peaches I sprayed last year about eight times, and we had most excellent results on this block. Other blocks right by it defoliated practically completely, but this block kept its foliage, but we felt it was due to arsenical injury rather than bacterium pruni. However, there was some on the block where this wasn't used, and there may have been just a little on the foliage of this particular block. I don't think it has any value in the control of bacterium pruni.

MR. MCDONALD: Is it more or less disagreeable than lime sulphur to apply?

MR. HURT: It is not disagreeable to apply at all. It is easy to apply and as pleasant to apply as the ordinary dry mix, and more so in a way, because it is easier to get into the tank, and when lead arsenate is used with it it doesn't matter whether you add the lead arsenate before or after. You can work it right up in the water.

MR. C. F. GILLAN: What would be a recommended spray schedule on Macintosh?

MR. HURT: We have had no experience on Macintosh because we do not grow that variety in Virginia.

MR. GILLAN: We had some experience with it last year, and some of it was not just so favorable. When we applied it we applied it first on the petal fall spray with one of those sprays, and in ten days we gave a second application, and in late June the third.

MR. HURT: You put on just three applications? That was all the applications you made for summer spraying?

MR. GILLAN: Yes. Was it the material or the time we applied it?

MR. HURT: It might be two things. Last year was an excellent scab year. All our checks had 100 per cent scab. Under ordinary circumstances you cannot hope to control a bad scab year with three applications with lime sulphur or Bordo mixture or anything. Ordinarily three applications would not take care of scab. We have gotten good results with calcium sulphide in scab control, as good as we have with lime sulphur or Bordo mixture.

PRESIDENT MCCAIN: We are now ready for the reports of the committees. Mr. Englar is Chairman of the Nominating Committee.

MR. ENGLAR: We have nominated:

President, ALBERT ALLEN

First Vice-President, G. S. L. CARPENTER

Second Vice-President, W. EARLE WITHGOTT

Secretary-Treasurer, G. RUST CANBY

Assistant Secretary, A. F. VIERHELLER

PRESIDENT MCCAIN: Are there any nominations from the floor?

MR. B. B. JONES: I move the nominations be closed and the Secretary cast the ballot.

. . . The motion was duly seconded and carried . . .

MR. ENGLAR: We have nominated for the

Executive Committee:

E. D. MCCAIN	J. A. COHILL
LEE ALLEN	FRANK HANSON
E. C. AUCHTER	G. HALE HARRISON
H. C. WHITEFORD	A. L. TOWSON
EARL WITHGOTT	J. W. ENGLAR

For the

Membership Committee:

A. F. VIERHELLER	H. C. WHITEFORD
GEORGE C. MCCLAIN	R. R. WALKER
W. B. MOORE	DWIGHT WALKER

E. D. MCCAIN

PRESIDENT MCCAIN: All in favor of the named given say "aye."

. . . The motion was carried unanimously . . .

PRESIDENT MCCAIN: Mr. Cohill, we will hear the report of the Resolutions Committee.

MR. COHILL: The Resolutions Committee brings these resolutions before you without any recommendations.

Resolution No. 1.

"*Whereas*, an appropriation for the much needed Horticultural Building at College Park has been passed by the Legislature and approved by the Governor, therefore be it

"*Resolved*, that the members of the Maryland Horticultural Society hereby express their appreciation to Governor Ritchie, Senator Earl Withgott, and others who were helpful and instrumental in making this action possible."

MR. TOWSON: I move the resolution be approved .

. . . The motion was duly seconded and carried . . .

MR. COHILL: Resolution No. 2.

"*Resolved*, that the Horticultural Society express its appreciation to Governor Ritchie and other state officials for the support and assistance rendered in preventing the spread of the Japanese beetle, thereby limiting the exten-

sion of the Federal quarantine against that insect. We wish to commend the Federal authorities for their active cooperation with the state in suppressive measures directed against this pest. And be it further

"*Resolved,* that we pledge our support to a continuation of the present state policy and appropriation for this important work."

MR. ENGLAR: I move the resolution be approved.

. . . The motion was duly seconded and carried . . .

MR. COHILL: Resolution No. 3.

"*Whereas,* the State Department of Markets of the University of Maryland since its establishment in 1924, has borne the responsibility of meeting the marketing needs of the State without funds sufficient to meet more than a small portion of the demands made upon it; and

"*Whereas,* the National policy calls for more effective work in the field of marketing farm products;

"*Therefore, Be It Resolved,* that we favor more adequate State appropriations for the work of the State Department of Markets in extending the Shipping Point Inspection Service, the Market News Service, Seed Certification, Market Surveys, Roadside Market Inspection, Inspection of Weights and Measures for agricultural products, the Promotion of Cooperative Commodity Organizations, and other related lines of work."

I would like to make a comment on that particular resolution. Some of us who are particularly interested in the inspection service in the State of Maryland last year particularly, held several conferences and gatherings about the State with the idea of more fully cooperating with the inspection service. Some of, of course, who were paying this money found the usual complaint of cost. I think that we should at this time at least commend our Chief of the Inspection Service, Mr. Shaw, who has cut that cost down, to less than any other state in the United States. So that I want to go on record personally as approving of that service. I think we should continue to cooperate with this service by helping in any way we can.

MR. ENGLAR: May I ask what you mean by "nominal cost"?

MR. COHILL: As I understand it, you got the service this year for $3.00 that actually cost in our territory where we cooperated with the inspection service, $3.39. I don't know what your cost might have been, but in Hancock where we gave full cooperation to the service we are very much pleased, that they have been able to get that cost down to a reasonable price.

MR. ENGLAR: Mine was $5.00 for only a few cars, and I think it was a reasonable charge.

DR. HOOPES: What was the appropriation for that work?

MR. COHILL: It was $10,000. Other states are giving probably two or three times that much money to it.

MR. TOWSON: I move the adoption of the resolution.

. . . Seconded by Mr. Walker and carried . . .

MR. COHILL: Resolution No. 4.

"*Whereas,* Maryland has been among the most progressive States in the nation in developing its Extension Service Work by maintaining a County Agent in every County of the State since 1917, and a Home Demonstration Agent in all except three Counties; and the expense of maintaining these agencies has been borne approximately one-third by the Federal Government, one-third by the State and one-third by the Counties; and

"*Whereas,* the payment of salaries of County Agents and Home Demonstration Agents from Federal and State funds has been recommended by representatives of the Department of Agriculture and members of the Farm Board, and already adopted by some states; and

"*Whereas,* the adoption of such a policy will tend to lessen the burden of taxation in the counties,

"*Therefore, Be It Resolved,* that we favor the general policy that salaries of County Extension workers be paid from Federal and State appropriations, thus leaving to the Counties only such appropriations for travel, clerical, and office expenses as may be necessary for the efficient conduct of the work."

MR. COHILL: Resolution No. 5.

"*Whereas,* there are now pending in the Congress of the United States certain bills, to wit: Senate Bill (S-685) and House Bill (H.R. 2154) which if enacted into law will permit the adulteration of other food commodities with corn syrup and corn sugar without a declaration upon the label; and

"*Whereas,* it should be accorded to each and every individual the absolute right to know what he eats and what he feeds to his children, therefore, be it,

"*Resolved,* by the Maryland State Horticultural Society in convention assembled this eighth day of January, 1930, at Baltimore, Maryland, that this convention protests the passage of these bills, either of them; and be it

"*Further Resolved,* that our Secretary be and is hereby instructed to notify Maryland's Representatives in Congress of the passage of these resolutions."

MRS. HARRIS: I don't know whether you have been reading about it or not, but the folks who are trying to put this bill over claim that is a bill to help the farmer to get more money for his corn, and that is not the truth. It is a bill to help the manufacturer to put something on the market that will only be half as sweet as sugar and will really work a hardship.

MR. JONES: If that bill passes you won't know what you are eating. If you don't know now, you have the right to know, because it is on the label, and if this passes there will be no labels and you won't know what you are eating.

MR. TOWSON: I move the resolution be adopted.

. . . The motion was seconded and carried . . .

PRESIDENT MCCAIN: We will hear from Mr. Moore, on the Auditing Committee.

MR. MOORE: Gentlemen, your Auditing Committee has found the accounts of the Maryland State Horticultural Society correct to the best of our knowledge and belief. This report is made as of January 4, 1930.

PRESIDENT MCCAIN: Our next speaker will talk on, "Recent Observations on Apple Scab." Dr. R. A. Jehle, of College Park, Maryland.

RECENT OBSERVATION ON APPLE SCAB

BY R. A. JEHLE,
College Park, Maryland

Mr. Chairman, Ladies and Gentlemen:

Those who were interested in the papers given yesterday will remember they brought out the fact that all problems of horticulture, entomology, and pathology are closely related, and you can hardly consider one problem without considering another. Before I heard Professor Gourley's paper on the factors which influence coloring in fruit, I didn't think of that as connected with my paper, but, I saw that the control of apple scab is very important in the coloring of fruit, because as he brought out, one of the factors which strongly influences the coloring of fruit is the health and vigor of the leaves, and the leaves cannot be kept in a healthy and vigorous condition unless the diseases are controlled. Scab is one of our most serious diseases.

Apple scab disease is present in all places and where apples are grown, but its severity depends upon a good many factors, especially time. I think that was brought out last night in Dr. Magness's paper when he stated that apple scab was not a serious problem in Oregon. I found the same thing when I went to Kansas. I found there that apple scab was not serious, but apple blotch was their serious problem. Here in Maryland and in the east scab is serious, and that probably is due to our climatic conditions. A number of years ago I gave a talk on the reasons for the failure in the control of apple scab and the conclusions which I drew then are just about the same as those I draw at the present time. Perhaps I would lay more emphasis on one of the points I brought out at that time than I do now, and that is, making the spray applications at the proper time.

Apple scab is one of the most widespread and destructive diseases of fruit. It occurs in practically every locality in which apples are grown and is especially destructive in climates where the spring and early sum-

mer are cool with plenty of moisture. In Maryland it is one of the most destructive and difficult diseases with which the apple grower has to contend. Ever since studies of the disease were published by the German scientist Aderhold* in 1894 apple scab has been made the subject of study by a large number of investigators in Europe, America and Australia. In spite of all of these investigations there are certain problems in connection with the apple scab disease which need further study before it can be most efficiently and economically controlled in Maryland.

Apple scab is caused by a fungus, a very small plant which obtains its nourishment from the fruit, leaves, and twigs upon which it lives. This plant is made up of masses of fine hairs which are so small that they cannot be seen without the aid of a microscope. The disease is spread to different parts of the same tree and to different trees by means of spores which serve the same purpose as seed in larger plants. There are two kinds of these spores, one kind which is produced during the growing season and spreads the disease to different parts of the same tree or to adjoining trees and another kind which is produced on the old dead leaves and starts the disease each season. These two kinds of spores differ from one another in their appearance and in their methods of spreading the disease. I will start with the disease in the spring and describe as much of its behavior as is known until it appears on the trees the following spring. Studies of Keitt and Jones† of Wisconsin indicate that the summer spores or conidia as they are called are produced very soon after infection takes place, even before the scab spots become visible to the naked eye and then their production continues on the scab spots throughout the entire season. They are as small as the finest particle of dust and millions are produced on every scab spot. The conidia are washed to different parts of the same tree or

* Aderhold, Rudolph. 1894 Die perithecienform von Fusicladium dentriticum Wal. (Venturia chlorospora f. Mali) Deut. Bot. Gesell. Ber. 12: 388-442.

† Keitt, G. W. and Jones, L. K. 1896 Wisconsin Agr. Exp. Sta. Research Bull. 73, 1896: 53-56.

to adjoining trees by rains or heavy dews. Wind and air currents do not play an important part in their distribution. In this respect they differ materially from the spores which are produced on the old dead leaves and which depend upon air currents to carry them up into the trees. Fortunately the spread of the apple scab fungus, is checked by certain weather conditions, dry atmosphere and temperatures above 70 degrees F. being unfavorable for its development. Mature leaves seem to be more or less resistant to apple scab. These facts emphasize the necessity of checking the development of scab early if the disease is to be successfully controlled. The most successful control of scab can be had by checking the very first infections. These first infections usually take place in the pre-blossom period and when they occur on the opening buds they place the fungus in a very favorable position so that the conidia can be easily washed to the young developing leaves and fruit by rains and dews. If many infections are allowed to develop in this early stage of the trees further development of the disease can be checked only by most thorough spraying and then only with great difficulty if weather conditions favor the development of the fungus.

The warm dry weather which develops later in the season does not kill the scab fungus but merely checks its development temporarily, its development being continued when cool wet weather begins in the fall. If the disease was carried over winter only on leaves which are visibly infected with scab in the fall, its further development could be easily explained, but in Maryland that is not the case. For the past three years extensive study of the fallen leaves in orchards located all the way from Snow Hill to Hancock has revealed the fact that not only does the disease live over winter on the leaves with visible scab lesions, but it also lives over on practically all of the leaves. The number of visibly infected leaves on the trees in the fall bears no relation to the extent of leaf infection in the spring. Even in the orchard at the Experiment Station in College Park, where very few in-

fected leaves could be found, they practically all became infected by the following spring during each of the seasons when studies were made. This was true of all other orchards examined in the spring whether they had been sprayed or not. Just how and where the apple scab fungus spreads to apple leaves which show no visible infection in the fall is not known. Whether the leaves become less resistant to the disease when about ready to fall or after they fall and then become infected by conidia which are carried to them by fall rains or whether the scab fungus merely grows into them from infected leaves after they fall on the ground is not known. Many of the leaves can be plowed under early in the spring but it is questionable whether enough can be destroyed in this way to materially reduce the danger of spring infection and certainly not enough can be destroyed to minimize the importance of thoro timely spraying in the spring.

After the apple scab fungus has entered all of the fallen leaves a spherical fruiting body about the size of a pinhead is produced, and in this body grows a second type of spore called ascospore.

The ascospores are produced in groups of eight in long transparent sacks, many such sacks of ascospores being produced in each fruiting body. Unlike the conidia the ascospores depend upon air currents for their distribution. When they are ripe the fruiting bodies open at the top and the sacks of spores grow out thru the opening. Here the eight spores are shot out into the air one at a time from each sack like the shots of a repeating pistol. After the fruiting bodies become ripe no ascospore discharge occurs until they are sufficiently moistened by rains or heavy dews and furthermore the apple tissue must remain moist for several hours before it can become infected. This means that there is little danger of scab infection after light showers or heavy dews but that there is great danger of infection following prolonged rainy periods especially when the temperature is between 40 and 65 degrees. As soon as the fruiting bodies are

ripe or almost ripe fruit growers will be notified thru the spray service and they should plan to have their orchards sprayed before the first following rainy period. Air currents carry the spores up into the tree where they produce infection. The fruiting bodies do not all ripen at once but a few of them ripen first, then they ripen in increasing numbers until a maximum number is reached and then the number declines until discharge is complete. The usual time of the maximum discharge was considered to be in the pink bud stage of the tree· that is when the cluster buds separate. During the past four years it has been earlier on the Eastern Shore of Maryland and on the Western Shore it was earlier two out of the four years. One year it occurred in the delayed dormant stage in Wicomico and Worcester Counties, and very soon after that in the other counties. In 1927 and 1929 when maximum ascospore discharge occurred while the trees were in bloom in the western part of the state a few warm days developed the fruit buds so rapidly that orchards which had not been sprayed earlier than the pink bud stage could not be covered before they were in bloom. The reason for the variation in the time of ascospore discharge is due to the fact that the fungus develops most rapidly at approximate temperatures of 40 to 65 degrees F. whereas the apple tree develops most rapidly at higher temperatures. The experiences of the past four years indicate that it is not usually safe for the Maryland orchardist to wait until the pink bud stage of the tree to make his second spraying application in the spring. These studies also indicate that the delayed dormant application may be the most important application for the control of apple scab during occasional years and that it usually protects the trees from the earliest ripening spores. Thus the three important scab control sprays in Maryland are the delayed dormant, pre blossom and calyx. The delayed dormant spray protects the trees from earliest ascospore discharges and in years when the fungus develops very early it may even be the most important spray for the control of scab. The pre-blossom spray is usually the

most important spray for the control of apple scab when it is timed so that the trees are protected from the maximum ascospores discharge. The problem of properly timing this application is one of the most difficult problems which confronts Maryland orchardists. The Extension Service can only give the orchardist information in regard to the stage of development of the ascospores in the old dead leaves. When he gets this information the orchardist must plan how he can get his orchard sprayed at the proper time if scab is to be thoroughly controlled. Oil sprays which do not contain a fungicide do not protect the trees from apple scab and when they are used in the dormant stage they may have to be followed by an application at the delayed dormant stage or a little later using summer strength lime sulphur for protection from satisfactory material for the control of scab. However, Hurt and Scheiderhan* reported very favorable results in the control of apple scab with calcium sulphide. They found that it gave better control of scab than lime sulphur and was not as caustic. The material used in the tests was prepared in a chemical manufacturing plant. As soon as it can be obtained commercially it should be given a trial by Maryland orchardists.

Spraying should be done before rainy periods if possible. After the scab fruiting bodies ripen on the dead leaves they discharge ascospores after the first rain and moisture is necessary for the germination of conidia as well as ascospores. For these reasons the orchardist should make every effort to have his trees protected with a fungicide especially his scab susceptible varieties, before these spring periods of cool wet weather set in.

Studies of the development of the scab fungus on the dead apple leaves will be continued and orchardists will receive notice of these developments and their relation to spraying applications from their county agents.

MR. D. GOLD MILLER: We have been taught that the pink spray is the first spray for the scab. Now, I have

* Hurt, R. H. and Schneiderhan, F. J. 1929 Virginia Agricultural Exp. Sta. Technical Bull. 36.

changed from lime sulphur to oil this year, for delayed dormant.

DR. JEHLE: I would stick to lime sulphur unless you have a problem so serious you must use oil. In that case, keep in touch with your spray service and find out when these sprays should be put on. Maybe it will be delayed dormant, maybe later.

That brings us back to what I wanted to mention before in regard to timeliness. One year out of four in the western shore we did get maximum discharge of spores during the calyx stage, but that year the weather got hot so fast that if a man hadn't started to spray before the pink stage he couldn't possibly get his trees covered before they were in blossom. Then he had no protection at all until he could get on with the calyx spray. Meanwhile, some of this discharge had taken place. He had no protection, because he didn't get on before. In that case it was necessary to get spray on before the pink stage. In Maryland all of us should get our spray material ready and be prepared to put a spray on before the pink stage.

QUESTION: You spoke of lime sulphur in killing the spores. Does it also help to prevent the entrance of the spores?

DR. JEHLE: Yes, it kills them after they germinate but before they enter the leaf.

The chemicals dissolve in the rain water or dew, and that is toxic to the spores, it kills the spores. The spore begins to germinate, and it practically commits suicide, as Professor Whetzel used to say, it starts to grow, and as soon as it starts to grow, the spray material penetrates it and kills it and it cannot grow any more. Thus it does not grow into the leaf, and you do not get infection.

MR. ENGLAR: Does the temperature at harvest time cause this scab condition to spread around?

DR. JEHLE: Not so much over the foliage as on the trees. It may spread in the foliage, you may get invisible infection, as I said, and that is the reason why we get this spring stage on all the leaves.

MR. ENGLAR: It spreads over the fruit in harvest time?

DR. JEHLE: Yes, as far as I know. Is that your experience, Professor Temple?

PROFESSOR TEMPLE: Yes, we get a lot of pinpoint infection.

DR. JEHLE: As soon as the weather gets cool we get rains in the fall and get the spread again on the fruit. On the leaves we don't get any visible infection. It may be invisible. After the leaves get ready to fall they may become suseptible. We don't know, but I say perhaps they become suseptible in the fall and become infected just before they drop off or after they drop.

MR. STUBBS: How long does the infection period last from the leaves on the ground?

DR. JEHLE: According to Jones, I believe it lasts up to July.

PROFESSOR TEMPLE: Ninety days; it depends on the season.

DR. JEHLE: Of course, your late sprays, your calyx and your two weeks spray take care of this. Your first two sprays usually take care of the spores that discharge late in the season, and at the same time, protecting you from conidia. That protects you from both kinds of spores.

MR. D. GOLD MILLER: We had a warm dry spell and it kept up two or three weeks so we had no scab, although we didn't spray for it.

DR. JEHLE: It just depends on when dry weather takes place as to how favorable conditions are for scab development. Where we get dry weather at the time of the maximum discharge of scab spores you didn't get much scab infection, whereas, in other sections where that dry weather occurs after this maximum discharge has taken place they got early scab infection.

MR. BROWSE: Have you tried a weaker solution than you recommend in the spray calendar?

MR. TEMPLE: They have been tried out, but did not do any good. The strength as recommended is supposed to be the best strength.

DR. JEHLE: I might mention something about Bordo for control of apple scab. As far as we know, Bordo is not any better than lime sulphur, in fact, some investigators reported that it didn't give as good control. I don't think there is any reason for changing over to Bordo owing to the danger of russeting. The time of spraying and the thoroughness of application are more important in scab control than changing the material. With calcium sulphide you might get some advantage over lime sulphur if it doesn't burn as has been reported. It ought to be tested out first in a small way, because, owing to varieties and our climatic conditions we can not know what it will do in Maryland until we test it out. I wouldn't advise using it in a large way this year, but I would advise testing it in a small way to see what it will do under our conditions.

PRESIDENT MCCAIN: I believe Mr. Cohill has another resolution.

MR. COHILL: This is in reference to the cider bill. Probably some of you fruit growers who were in Annapolis last year know we lost out on a bill over there with reference to adulterated or colored cider. This resolution will explain it:

"*Whereas,* it is the desire and purpose of this Association to promote the welfare of this state and our neighboring states and to that end to provide the orderly marketing of fruit and fruit products, and

"*Whereas,* this Society believes that the present methods of labeling and selling colored distilled vinegars in the State of Maryland are likely to mislead and deceive the purchasing public as to the kind of vinegar so advertised and labeled; and

"*Whereas,* this Society desires to go on record in favor of the enactment of legislation providing for the labeling and sale of vinegar in the State of Maryland,

"*Be It Resolved,* that the Maryland State Horticultural Society ask the Governor and the Legislature that the so-called Uniform Vinegar Law, which was introduced at the last session, be presented again for passage."

DR. HOOPES: I move the resolution be adopted.

. . . The motion was duly seconded . . .

PRESIDENT MCCAIN: I might say on this resolution that your Executive Committee went to Annapolis last year to have this passed and were not successful. It will primarily be beneficial to the vinegar growers, and indirectly probably helpful to the apple growers if they can get any better price for their cider apples. We all hope following these talks that we will not have cider apples, but we generally do. This a bill providing for the sale of vinegar and to have it marked for what it is. That is what it amounts to. If it is not cider vinegar but adulterated, it is to be so marked and sold that way.

MR. NOFSINGER: The Federal law covers that, does it not?

PRESIDENT MCCAIN: No.

. . . The motion to adopt the resolution was seconded and carried . . .

PRESIDENT MCCAIN: We have saved Dr. Auchter for the last so as to rather summarize what has gone before so we will now call on Dr. Auchter to speak on, "Adjusting Orchard Practices to Meet Market Requirements."

DR. E. C. AUCHTER: Mr. President, Members, and Friends: It is fine to attend a meeting which has so many growers from so many states as we have here today. When you get such an excellent bunch from Maryland, West Virginia, Virginia, and Delaware all interested in these very fine papers that we have, you feel encouraged for the future of the whole industry.

I don't think I can do very much more than summarize the papers that they have presented, and possibly add one or two thoughts to them.

The title of the subject is, "Adjusting Orchard Practices to Meet Market Requirements," and it immediately

brings up the question of, what are the market requirements? Fortunately, we have a lot of growers here who have been trying to meet market requirements, and we have a good many market people here who know what they have been trying to get in the fruit line, so if I am off on market requirements, I am sure you can all help me.

It has been rather impressed upon me in the last four or five years particularly, that the markets wanted high quality fruit, and they wanted it cheap. What is high quality fruit? Well, each one of you have in your minds what high quality means. I don't think any of us would agree as to what high quality is. The chemists tell us it is a certain percentage of sugar, a certain percentage of acid, a certain amount of total calories, a certain amount of water which makes a crisp, juicy fruit.

Oh, you might say, my idea of quality is Grimes Golden, or Mackintosh, or Delicious. It all depends on the individual. I think I said before this Society last year that there was a very good example of our ideas of quality in the meeting up here at the State College when Dr. Fletcher took twelve varieties of apple and pared and sliced them and put them on plates and numbered them from 1 up to 12, and he had different people taste slices from each plate to see which ones they would rather have, which ones they would rate highest quality, and Ben Davis stood at the head of the list. So it is possible that quality is something like beauty—only skin deep; when we remove the skin we don't know so much about quality.

But forgetting the chemist's idea and our own taste, when we talk about quality we mean we want good size, and good color unless we are going into exporting in certain markets abroad where they want smaller sizes. But as a whole, in this country we want good-sized apples and good color.

Are we producing good size and good color in this country in sufficient quantities so that it will be profitable to us as growers? Unless we can produce high enough yields per tree of this good size and good color,

we are not interested in trying to get it. If we can get good, high yields per tree and annual production, then we can afford to sell this fruit at a lower price per bushel or per barrel and still make a fair margin of profit even in years of heavy production when prices are not very high.

I think that is a fair statement. There is no question but that when all conditions in this country are satisfactory in the various states for a good set of fruit, that then it becomes very important as to whether we have a large enough production per tree as individuals to get that cost down cheap enough to make money. In other words, if we have got a good set of fruit buds in apples and peaches throughout the United States today and in no sections any frosts occur or freezing occurs, and there is good weather at blossoming time so we get a good set, we all know that the prices are not going to be very high, and we are approaching over-production.

In that connection I would like to reiterate what I have said before eight or ten horticultural societies this winter from here to the west coast, and that is, the sooner a lot of these promotion orchards go out of business, the better. I mean by that orchards which were started years ago by lawyers, doctors, merchants, etc., and they thought they could plant a tree and a little bit later pick some fruit off of it and make a fortune. They found that it takes work nearly 24 hours a day, to grow good fruit and make a profit out of it. What has happened is that they have been neglecting these orchards, neglecting them to a place where they have a profit occasionally, until the year that we all have a profit, and that fruit simply helps glut the market. I hope that many of these orchards which are not taken care of and orchards which will not break the owners as to whether they make any money or not—I feel that those orchards that are not handled properly in taking care of insects and diseases, which do not get good attention, that the sooner they go out, the better.

When I say that I do not want this to be understood that I want all lawyers, doctors, and merchants who have

orchards to sell them or get rid of them, because some of our very best orchards are being grown and handled by those men. But I do hold that for the group of people who are not taking care of their orchards. In the last ten weeks I have seen literally thousands of acres of that kind that have hardly had anything done to them for three years or longer, and they certainly are hurting the good fruit growers. The man who is in the business to make a living will be a factor in his community, that good, substantial fruit grower, and we should do everything in our power to assist him by all the help which comes through Federal and state and county aid.

I want to talk about this thing of size and color. Are we getting size and color? There was an awfully interesting little study made up in Michigan recently, and I just wonder how it is checking up with the Maryland growers, the West Virginia and Virginia growers. We don't happen to have anything in the Shenandoah Valley along this same line, but I would like to show you how up in Michigan in the last three years they went out to several cooperative packing houses where all the fruit was picked from the trees and brought into this packing house and there graded and packed and sold. This constituted many thousands of acres in the fruit section of Michigan, and the average way this fruit packed out, was something like this:

The Baldwin variety they packed A grade and B grade and culls similar to our U. S. No. 1 and No. 2, and of all the Baldwins up in that section there were brought in only 38 per cent which went into the A grade, 37 per cent went into B grade, and 25 per cent were culls.

Jonathan was 58.7 per cent A, 27 per cent B, and 15 per cent culls.

Rhode Island Greening, 59 per cent A, 27 per cent B, 15 per cent culls.

Grimes, 61 per cent A, 29 per cent B, and 10 per cent culls.

Mackintosh, 76 per cent A, 17 per cent B, and 6 per cent culls.

If we average all their varieties, the apples up there in Michigan averaged like this: 57 per cent from the trees were A grade, 28 per cent were B grade, and 15.5 per cent were culls.

Can we be content with those figures?—in the Shenandoah-Cumberland Valley region? Are you willing, for instance, when you pick your apples and take them into the packing house, are you satisfied to get only one-third of them U. S. No. 1?

Or are you satisfied with 61 per cent? I don't know. What is a good average? One man says he got 98 per cent. One man said 98 per cent on 300 acres. Mr. Englar says he wants to go and look at those apples. I don't blame him.

Another man says if he got 75 per cent he would be doing well. Well, are we averaging 60 per cent in the Cumberland-Shenandoah region with Romes and Grimes? If not, can we afford to grow 40 per cent not U. S. No. 1? Mr. Englar says no. I think I agree with him. We have got to beat 60 per cent.

They carried it a little further up there, and they tried to figure out why these apples were in these grades. Here is what happened to the apples that were thrown over into B grade: 42 per cent in B grade were there because they were under-sized, and of that bunch 24 per cent of them would have been there because of limb rub, mechanical bruises. Here is a bad one— 15 per cent of them were in there because of rough handling.

Just imagine that, a highly perishable product—after growing this stuff, pruning and all kinds of things, cultivating, buying nitrate, spraying, and all the bad work connected with that, that you are willing to throw 15 per cent in B because you want to handle them like pumpkins instead of apples or instead of like an egg.

I will tell you what they mean by rough handling—dropping the apple into a basket in picking or into a sack onto another or when they came to empty the box, letting them go and letting the apples roll down, and

when they got the box in the packing shed throwing it on the grader in such a way as to bruise.

The thing I am interested in particularly is that we have got to pay attention to this rough handling. You, of course, know the history of the moving of citrus fruit from the west. You know years ago when they were having trouble getting citrus fruit to market and they couldn't find out what was the matter. They seemed to be well iced enroute, yet they were arriving in terrible shape in the eastern market. The Government sent investigators out there, and they pinned it right down to rough handling. They spoke to the growers and the growers were educated through the extension service on how to prevent rough handling, and we haven't had any trouble with the moving of citus fruit since.

I would be inclined to put down three things—water, mineral nutrients, and I would have particularly in mind there nitrogen, and I would put down carbohydrates as the three major things affecting size and color of fruit.

We know when we have a pretty dry season the size of fruit normally in most orchards is rather poor. We know also if you have an orchard low in vigor and are not feeding the mineral nutrients, it is making very short growth. The fruit is generally small in that orchard. We know also that if we let apple scab knock off a quarter or a half of the leaves or so puncture the leaves that they are not very efficient even if they do not fall off, or if insects chew them up and reduce the carbohydrates, or a good old example is cedar rust which so peppers the leaves they cannot operate, we know we don't get much size.

Some years ago I was running thinning experiments on Mr. Miller's orchard, and we thinned a block of trees so the fruits were no closer than three inches apart, another block so they were six inches apart, another block so they were ten inches apart, and we thinned some early before the June drop, and another block after the June drop, at all these distances, and another block along in July, and another block along in August to find the best

kind of thinning, best distance apart to thin and all that. We didn't get any apples at all that year that were of a decent size regardless of thinning, because cedar rust came into that particular block and peppered it and the leaves couldn't function. Mr. Miller had excellent soil, excellent soil management, good fertilization, but he was getting no carbohydrates.

You heard Mr. Miller say that he handled the soil in one orchard unusually well, he handled the fertilization problem well including organic matter, he did a good job of thinning and a good job of pruning. What was he doing? He was proving what Dr. Gourley brought out the other day. He said we used to think that growth was opposed to fruitfulness, but now we have found out that fruitfulness is associated with good growth. If we have good growth we have good fruitfulness, and if we have good growth of the terminals and spurs and trunk and roots and main limbs, and good leaf area, we are going to get good size and color. If we did so handle our orchards as to get a good supply of organic matter in the soil, we will go a long ways towards improving moisture conditions.

If we prune these old trees thoroughly by small cuts all over the tree, having in mind that the influence of the cut is in the immediate vicinity of the cut, and that if you remove a little branch here those spurs and branches immediately around them are going to get more water and nitrates, and if you cut another one over here, the same thing, and if by doing that all over the tree we will get a much greater effect than if we cut off one big limb even though we remove twice as much weight, so if we do good thorough detailed pruning over the tree we increase the amount of water and the amount of mineral nutrients to each bud left, so that we get greater growth, greater leaf area, more carbodydrates formed, and better sized fruit.

Where does thinning fit in? It is the same story that one of our speakers was discussing, that if we reduce the number of apples per tree we have more water and more

mineral nutrient to each apple left. But we have more leaf area per apple left, and with more leaf area we get more carbohydrates formed, and then with more carbohydrates up comes the size and color of the fruit.

He gave you, I think these figures. I think it won't do any harm to repeat some of them here, some work that has been done on the Government farm at Arlington, and also Wenatchee recently. I am giving these out of memory, but it is very close.

What he did was to take a big limb between the size of your arm and leg and girdled it so that none of the carbohydrates could get back beyond that girdle to start with, so that all the carbohydrates up here on this limb had to be used up there. Then he thinned off apples or leaves either one until he could control the number of the leaves that were left there per apple, and what he found was something like this:

If he had 50 leaves per apple they packed out 88 apples to the box. If he had around 30 leaves per apple it went around 113. If he had 20 leaves per apple it took 165 per box, and if he had only ten leaves per apple it was over 200 apples per box. In other words, the size of the fruit out there went right with the leaf area per apple.

You say, "Yes, but water is a factor." I agree absolutely, but out in Wanatchee where this was checked up, under irrigation, they had plenty of water but were limited in carbohydrates. We had plenty of water, plenty of mineral nutrients, but carbohydrates were limited, and as soon as you limited those carbohydrates, size went down.

Thinning, then, in reducing the competition for carbohydrates, even though we have plenty of water and nitrogen, will pull up size and pull up an increased color. What Dr. Magness was driving at was if we could reduce the number of apples per tree so as to have plenty of carbohydrates to take care of these good-size apples and still an accumulation so that many of these fruit buds which are forming later in July and August would have enough carbohydrates to change the fruit buds and not

stay leaf buds, that then we would approach annual bearing.

That is perfectly sound reasoning and apparently worthy of a good deal of careful study and experimentation in the next four or five years.

Fertilizer comes under mineral nutrients.

Pollination—where does pollination come? Dr. Heinicke emphasized that to us, that a well pollinated fruit even on a weak spur sets better. Why? Those seeds apparently act in some way to increase the water content for that fruit and the mineral nutrients going into it. In other words, if we have these trees well pollinated and increase our number of seeds per fruit, that fruit starts off quickly at pollination time. It not only does not drop, but it has a greater chance because of its draw on water and mineral nutrient to keep growing steadily. You know and I know what happens if your fruit ever stops growing once. You know it is a terrible job in an orchard where fruit has stopped growing, to get that thing started again. Good pollination, I believe, is of importance in that those fruits have a greater chance of a steady growth even under abnormal conditions, and any object which grows along steadily is bound to be a better matured object, I think, with better color development.

MR. D. GOLD MILLER: How far do bees fly?

MR. JONES: They will go five or six miles if they have to go that far.

MR. HARRISON: The flight of bees is often influenced by the wind. They will fly against the wind rather than with it because they get the odor of the blossoms.

DR. AUCHTER: Then we come down to spraying. Of course, it is unnecessary to emphasize that spraying comes under carbohydrates, and no matter how well we cultivate, fertilize, thin, and pollinate, if we don't do a good job of spraying we are simply cutting down that percentage of carbohydrates. If we are going to cut down carbohydrates after we do all these other things, it is just too bad for us. Our fruit is not going to size and color the way it should.

Just a word on a little test that has been running up in western Maryland; an irrigation plot on apples. I don't say I am recommending irrigation as yet, but up there this past season it has been rather dry, and in that irrigated plot the fruit is much better sized and much better colored.

Dr. Magness indicated that if there was a soil moisture deficiency that it so affected the leaves that the pores were closed for several hours during the day. That meant less carbon dioxide, and consequently, less production of carbohydrates. If they are open, they go ahead working. So I think there in that irrigated plot we have gotten a direct increase due to water and due to carbohydrates.

Just a word reviewing Gourley's work. He says these things which make up color eventually start from sugars. Don't forget that this coloring matter in fruit starts back with the elementary sugars, and that they come from the leaf area, so in order to have good coloration it is necessary regardless of other things, to have plenty of carbohydrates, which means again great leaf area.

I think in this adjusting orchard practices to market requirements, we have got to increase the production per tree. We have got to increase the production per tree of good fruit, which means that we have got to pay more attention to getting good fruit in our orchards. I mean foliage as well as wood, and that means that we have got to get away from a lot of haphazard—and sloppy methods that many of us are using. I never realized it so much until I made a recent trip into the northwest and saw the way they handle the orchards from the standpoint of pruning, from the standpoint of proper spacing of limbs while they are young, foliage, well spaced branches, excellent spraying programs which they follow, the working out in the different sections of the proper soil management for each section. I find in one section that they can't cultivate any more, they have to use alfalfa, and for some reason or other they have to grow it there and let the roots go down through this soil, and they get wonder-

ful results. Over here fifty miles away they can't grow alfalfa in that section at all, but they are growing alfalfa out here in a farm field, cutting the alfalfa, hauling it over, and putting it in the orchard.

When I find those sections figuring out their problems for local reasons and doing the pruning job they do, and taking care of the pollination job and playing up every factor that will increase growth and increase a high percentage of fancy box apples, you know, we have got to admit we are pretty sloppy back here. I wish we could all take a trip out there and see some of the things they are doing. I think we would come back here and try to do things better. But I know this, that if we don't do things better, and if we don't give attention to our individual orchards and just follow our neighbors, do what they do—maybe this fellow ought to prune hard, maybe this one ought to prune light; maybe this fellow ought to use ten pounds of nitrogen, and this fellow only two. You have to work out your own conditions, look at your own trees, study them, get your extension men to go over your orchards with you and diagnose your own particular orchard to the place where you increase the annual production per tree. If we don't do that, the west is going to lick us.

I heard four or five years ago before this Society that the west would hang on a few more years and then go out of business. Don't ever think that true. The Wenatchee fruit section will be in the fruit game when we are out of it, and if we don't get busy and do a few things that are a little bit better, we are going out of it much quicker than we want to get out.

I hope you will pardon me for talking so frankly.

PRESIDENT MCCAIN: There is just one appointment that has not been made, and that is a representative of the Horticultural Society to the Maryland Farm Bureau. I would like to appoint Henry Whiteford to that position.

. . . The meeting adjourned at twelve-forty o'clock . . .

REPORT

of the

TWENTY-THIRD ANNUAL MEETING

of the

Maryland Crop Improvement Association

January 8 and 9, 1930

BALTIMORE, MARYLAND

The twenty-third annual meeting of the Maryland Crop Improvement Association was held in the Lord Baltimore Hotel, Baltimore, on January 8 and 9, 1930. The general topic of discussion for the two meetings was soil fertility. At the first session, which was a joint meeting with the Vegetable Growers' Association, fertilization of such crops as potatoes, tomatoes, and truck crops was discussed. The second session was devoted entirely to the fertilization and the planting of permanent pastures. Attention of the members is called especially to the articles on fertilization of permanent pastures, the economic importance of a pasture, the competition between pasture grasses when planted in mixtures, and the effect of fertilizers on the quality of tomato crops. All of these articles give the very latest experimental evidence on the subjects mentioned and their publication here will doubtless precede their publication elsewhere by many months and in some cases perhaps several years.

The quality of the corn exhibited in the State Show this year was considerably better than was anticipated from the indications afforded by the early corn shows in the various communities of the state. The drought during the summer of 1929 was the severest known in many years. Fortunately it began early enough to permit corn

growers to successfully combat weeds. This in turn removed the worst enemy of the growing corn crop, the final result being a crop which nearly equals the five-year average. The total number of exhibits was 150, which is slightly larger than usual. The grand trophy, which is a silver water pitcher, was won by Mr. John S. Ward, of Leesburg, Virginia.

A new class was added to the premium list for potatoes. All of the exhibits in this class were from certified seed potato lots, and were grown by members of the 4-H Club in the state. In the class of late potatoes (Russets) the exhibits represented boys who grew the crop under a co-operative arrangement between the Baltimore and Ohio Railroad and the Extension Service. The cobblers exhibited were from the early potato section of Worcester County, and were exhibits of a late crop for seed purposes. The interest in potato production and exhibits warranted not only retaining this class but greatly enlarging it.

The corn judging contest attracted no less than ten corn growers. The medals for the winners in this contest are made available through the courtesy of the Southern Planter, of Richmond, Virginia. The winners in this contest were as follows: Gold medal, John S. Ward; Silver medal, Ira V. McKenzie; Bronze medal, B. A. Rucker. At the annual business meeting held during the second session the following officers were elected:

President—MATT HARDING, Cambridge, Maryland.

Vice-President—IRA V. MCKENZIE, Cumberland.

Secretary-Treasurer—F. W. OLDENBURG, College Park.

Mr. Harding was also elected member of the Executive Committee to the Farm Bureau Federation representing the Crop Improvement Association.

TREASURER'S REPORT

Maryland Crop Improvement Association
January 1 to December 31, 1929

RECEIPTS

Balance, January 1, 1929 (Including $2.00 outstanding checks, 1928)	$ 63.39
Membership Dues	60.00
Appropriation Agricultural Society	250.00
	$373.39

EXPENDITURES

Outstanding check (1928 account)	3.50
Torsch-Franz (Ribbons)	13.41
Hennegen-Bates (Trophy)	18.00
Geo. L. Schuster (Judging Corn Show)	18.58
Geary Eppley (Judging and Speaker)	10.49
R. F. Hale (Speaker)	5.15
M. M. Stewart (Farm Bureau Dues)	20.00
Labor, Corn Show (Reimbursement J. E. Metzger)	4.00
Premiums (Corn Show)	207.00
M. T. Bowdoin (Stamps)	4.00
Keystone Printing Company (Premium List)	16.50
M. T. Bowdoin (Stamps)	4.76
Andrews Paper Company (Corn Show Supplies)	7.00
Cash in Bank, December 31, 1929	41.00
	$373.39

Baltimore, Maryland,
January 8, 1930.

We the undersigned have examined the books of the Treasurer of the Maryland Crop Improvement Association, and have found them correct.

Auditing Committee,

IRA V. MCKENZIE,
MATT HARDING.

PRESIDENT'S ADDRESS

FRED C. JONES

Members of the Maryland Crop Improvement Association, and friends:

I am pleased to have the opportunity of addressing you today on the subject of Crop Improvement, for that is the name of our organization and that is what it stands for, and the goal for which we as members are striving to attain.

I believe it to be a sort of an unwritten law, that any institution will forge ahead and prosper just exactly in accord with the quality of service that it renders to the community where it exists, and certainly this law holds true with this organization for as I see it, its sphere of usefulness is almost unlimited.

The matter of better growing, of better harvesting, and better marketing of crops is in a large measure a matter of education, and the best way in the world to get this education is by careful thought and study of needs and requirements of the crops, and by careful observation of results of our efforts, so that we may be able to profit by our mistakes and try not to make the same mistake twice.

To my mind the Crop Improvement Association offers the best opportunity for service along that line that could possibly be devised. It brings us together, so that we can compare notes and match our experiences as a body, and have the opportunity to hear these splendid talks from men who have had the experience which maybe some of us lack and who have, through special training, been able to learn a great deal more about plant life than some of us could ever know.

For instance, take the question of fertilizers. How would the average farmer ever know what kind of fertilizer to use for a given crop unless he knew the elements from which the crop is formed? He has no facilities for learning about this unless he does associate himself with some organization like this one.

The problems that present themselves in the successful growing of crops in this day and generation are so many and so varied that the farmer is obliged to keep himself posted as to modern methods and latter day developments both of increasing yield per acre and reducing cost of operation, if he would attain any degree of success.

I am sure that the quality of the grain grown in our part of Maryland is very much improved over what was produced a few years back, and this improvement can be traced in many instances directly to the Maryland Crop Improvement Association. This Association certainly has proved its value and it is our job as farmers to boost it and try to increase its membership, and try to get more people interested in it, so they will attend these meetings and learn how to solve these problems that are becoming more complicated every day.

Here are a few of the questions that we need to ask ourselves:

Are we using the proper care in the selection of our seed? Are we careful in preparing the seed bed for our crop? How about the time and method of cultivation? How about the marketing? Do we keep the quality of our product up to the standard that modern markets require?

Let's take a lesson from some of our western fruit and poultry growers, whose products always "top the market" because they have long ago learned that it pays to "grade" their product, and offer for sale the best and nothing but the best. I thank you.

TOMATO FERTILIZERS FOR QUALITY

BY R. P. THOMAS

The importance of growing tomatoes in Maryland is readily understood when it is known that over 80% of the packing plants in Maryland can tomatoes. Maryland formerly was the leading state in this product but now she has to share this honor with California. Indiana is also gaining rapidly. At the present rate of production

it appears that both Indiana and California will soon be far ahead of Maryland because the area suitable for tomato production in these states isn't so limited as it is in Maryland. This will give them a better control of the market than they now have, and at a loss to Maryland. In order to meet such conditions it seems as tho Maryland will have to develop either a greater production per acre or the quality of her products. At this time there is no reason why Maryland can not increase both the quality and quantity of her tomatoes.

Before we consider the production of quality in tomatoes in Maryland let us discuss what quality is and how it may be produced. Probably all here are familiar with how quality is determined and judged in the canned products but very few have such an understanding of what gives quality to the fruit to be canned. There are a number of so called essential elements or plant foods that are necessary to produce quality in the fruit but we are concerned only with those which might be deficient in our tomato soils. Thus we will discuss only nitrogen, phosphorus and potassium at this time. The element or plant food nitrogen is important for its production of foliage, vegetation, leafy portions, etc. The old saying is that nitrogen begets vegetation. The nitrogen in plants is contained largely in the proteins of the plants such as the protoplasm which might be called the heart or the life producing portion of the tiny cells of the plants. From this you can readily see that nitrogen would not directly effect the quality of the fruit since vegetation and fruit are very different. On the other hand, nitrogen may effect the quality of the fruit indirectly. If there is too much nitrogen in proportion to the other plant foods it may decrease the quality of the fruit by producing such a vegetative growth that the fruit would not have time to mature or there would not be enough of the other plant foods to produce fruit.

The element or plant food phosphorus is contained in some of the proteins as nitrogen but it produces different effects on plants. The common saying is that phosphorus

produces seed or fruit and this isn't far wrong. Phosphorus will do more to produce quality in fruit and grain than any other plant food. It also hastens maturity or early fruiting. It will produce plumper fruit and also fruit of a better color. But it will do none of these things if the plant is deficient in another plant food or will have no effect if the plant is already able to obtain all of the phosphorus it needs. The plant will not take up more phosphorus than it can use in its manufacture of vegetation and fruits but this is not true in respect to nitrogen or potassium.

The element or plant food potassium effects the plant in a number of ways. It improves the health and vigor, increases photosynthesis or the manufacture of plant materials, and the plumpness of grain. Its effect on plants can be compared to the effect of police and doctors on the general public. It has been said that potassium will increase the resistance of plants to diseases, etc. However, our plant doctors say there is no truth in such statements. A deficiency of potassium in the plant will decrease its resistance to diseases but an increased amount over that essential has little effect on the ability of the plant to resist the invasions of diseases. It has been said that potassium will help to color up fruit. This is only where the plant is deficient in potassium. The plant reacts to an excess of potassium very much as it does to an excess of nitrogen. That is, it will take it in or consume it and show no benefit. A large consumption of potassium by the plant will increase the nitrogen content of the plant and decrease the other bases as sodium, calcium, and magnesium. When plants are luxuriant feeders on potassium they will always take up an equally large amount of nitrogen. This will tend to produce a delay in maturity and fruiting. It seems as though potassium fertilizers always give better returns in dry seasons.

From this discussion it can be seen that phosphorus and maybe potassium can influence the quality of fruit if they are deficient, not if there is plenty in the soil for

normal growth. An excess of nitrogen may be detrimental. This conclusion is backed up by the results published by the following experiment stations: Del., Ind., Ill., Md., Mo., N. H., N. J., N. Y., Tex., and W. Va. The results to date of an experiment we have been conducting at College Park to determine the effects of different fertilizers on the quality of tomatoes show that of the single elements, phosphorus is by far the most important. A complete fertilizer gave the best quality and yield. Then fertilization of tomatoes for quality resolves itself into the proper fertilizer for the soil to supply the tomato plant with enough of the various plant foods to produce a good growth—or to supply the soil with the plant food material in which the soil may be deficient.

Before we take up the discussion of supplying the fertilizer needs of a soil for tomato production we will discuss briefly what happens to the various fertilizers when they are applied to the soil. A nitrogen fertilizer is divided into organic and inorganic sources. When the organic form is applied to a soil the organic matter is decomposed and the nitrogen liberated in the form of ammonia. (This process as a rule is rather slow.) The ammonia then is changed by the bacteria in the soil to the readily available nitrate form of nitrogen. It is in this form that most of it is either used by the plant or leached from the soil by rains. The principle inorganic forms are nitrate of soda and sulfate of ammonia. The nitrate of soda is available to all plants immediately but it is also very soluble and readily leached. The sulfate of ammonia is soluble but is not readily lost by leaching as the ammonia is first absorbed by the soil then changed over to nitrate nitrogen by the bacteria in the soil. This is the form from which it is used by the plants and also lost by leaching.

Most of the phosphorus used in fertilizers is generally one form or another of calcium phosphate. Regardless of what form it is in when it is applied to the soil it is soon changed to a calcium, iron, or aluminum form of phosphate which is less soluble or available. Fortunately

as well as unfortunately, phosphate fertilizers move very little after being applied to the soil. It only moves down very slowly in the soil and does not leach. Therefore, for the best returns with phosphorus fertilization the phosphorus should be placed where it can be easily obtained by the plant roots. Nitrogen can be applied on top of the soil and then supplied to the roots by the rains but phosphorus is not moved very much by rains.

Potassium is generally applied as the sulfate, muriate, manure salts, kainit, etc. The potassium in any or all of these forms is soon changed when applied to the soil, as it reacts with exchange complexes in the soil where it is held at the expense of other bases as sodium, calcium, and magnesium. This results in practically no leaching of potassium from the soil and in the potassium being made less available to the plant roots than when it is applied. From this discussion we can see that the nitrogen applied in fertilizer will move about freely in the soil and may be readily lost. Phosphorus moves very little and is not lost by leaching. Potassium may move some when applied to the soil but it is not lost by leaching. This makes nitrogen fertilizers suitable for top or side dressing and phosphorus and potassium fertilizers unsuitable.

Tomatoes are one of the group of plants which require their nitrogen, which they feed on, to be largely in the nitrate form. Then the nitrogen used in a fertilizer for tomatoes should be nitrates or a form which is rapidly converted to nitrates. In our test (conducted at College Park) with the different carriers of nitrogen on the yield and quality of tomatoes, sodium nitrate gave much better results than any other form of nitrogen except manure. It is believed that the manure gave the best results because its applications were large. In any practice of nitrogen fertilization for tomatoes it must be remembered that at least one-half (and some say three-fourths) of the nitrogen which the plant requires is taken up by the plant before it begins to bear fruit. Thus the tomato plant wants a large portion of its nitrogen early and in the nitrate form.

Our results at College Park show that the tomato plants are able to use most any form of phosphorus about equally. These tests, as well as the tests at Ridgely, show that phosphorus is the one single fertilizer ingredient that influences the yield and quality the most. Our results as well as those from other states indicated that any fertilizer for tomatoes should be high in phosphorus.

In regard to potassium we secured good returns for its use on tomatoes at Ridgely but this increase was not as great as it was for phosphorus. At College Park, potassium gave us only slight increases. Phosphorus and nitrogen were both more satisfactory than potassium. A heavy application of potassium may give good returns for two or three years. But as very little is lost by leaching it is doubtful if continued heavy applications of potassium would prove profitable on Maryland soils for a very long period.

Practically all the experimental data throughout the country shows that a complete fertilizer is best for tomatoes. It also shows that phosphorus gives the best returns and should be the principal ingredient in the fertilizer. The survey of fertilizers used by the tomato growers in Maryland indicates that a 2-8-5 fertilizer is the most popular. This may be due to the cost of the fertilizer, the ease of obtaining it, just a general practice, or it may be that it gave the best returns. This survey also reports that the average acre application for tomatoes is between 500 and 600 pounds. From the advance copies of the Maryland standard fertilizer recommendations for 1930 it seems as tho a 5-8-7 is going to be recommended for most of Maryland tomatoes.

This should be an excellent fertilizer for the tomatoes which are marketed green and for canning tomatoes which do not make much of a vine growth. For soils on which a rank growth of vine is produced I would prefer to use a 3-8-5 or a 2-8-5. It will take a little more labor but if I were growing tomatoes for canning I would rather use 1000 pounds of either the 3-8-5 or 2-8-5 and top dress with some nitrate of soda or similar nitrogen

compound as it seemed necessary than use 600 pounds of the 5-8-7 per acre. Where considerable manure has been applied just previous to the tomato crop I would use a 0-12-5 fertilizer. As it is very unlikely that any two tomato growers have exactly the same conditions he will have to select the fertilizer which is best suited for his conditions. However, any user of fertilizer should consider the residual effect of his fertilizer mixture. Nitrogen is changed to the nitrate form and easily lost, the phosphorus and potassium are not lost by leaching but may be changed to a form which is probably less available to the plant.

We can conclude from the work that has been done in Maryland and other states that the quality as well as the quantity of the tomatoes produced in Maryland can be improved. A heavier application of fertilizer would have to be used. This fertilizer should be highest in phosphorus, lowest in nitrogen and probably somewhere in between these amounts in potassium. The exact fertilizer ratio for the most profitable returns will depend on individual farmer's conditions.

FERTILIZERS FOR POTATOES

By J. E. Metzger and E. H. Schmidt

The average potato acreage in Maryland during the last five years was just slightly under 44,000 acres. This represents about 1.4 per cent of our total crop land and is equal to about one-tenth of our average corn acreage. Nearly 40 per cent of the total acreage is devoted to the production of early potatoes, or what is more properly called "second early" when the entire country is taken into consideration. The remainder, or about 26,000 acres, constitutes our late crop. From a state standpoint our potato crop might properly be divided into three classes; namely, early, early late, and late. These classes are justified both from the standpoint of planting and harvesting dates and are necessary on account of the fertility practices and recommendations.

The Maryland Experiment Station has conducted fertilizer experiments in each of the regions in which the above planting practices predominate. These tests from which our recommendations are taken were conducted at Snow Hill, College Park, and at near Frostburg but in Garrett County.

The most extensive of these field tests is the early potato work at Snow Hill. This work was begun in 1924. In the early stages of the tests special attention was given to the sources and proportions of nitrogen and potash used. After the first three or four years, it became evident that information on many management problems were being brought to light also. It is because of this phase that the work is being continued and it is with this feature of the tests that this report will deal mainly.

Rotations

In the early potato areas of Worcester and Somerset Counties, the prevailing rotations are either a three-crop two-year rotation or a four-crop two-year rotation. Occasionally a three-year rotation is used. The two-year rotation of three crops consists of white potatoes followed by green manure (rye and vetch) with this crop turned under the following spring for a crop of sweet potatoes. In the four-crop system corn is planted between the rows of potatoes and rye follows. The rye may be turned under for either white or sweet potatoes. In either case it is an intensive system with a large preponderance of cultivated crops which tends to hold the organic matter at a very low level and which requires large quantities of commercial fertilizer.

In the old fertilizer formula of 7-6-5 a large part of the nitrogen was from an organic source such as fish meal and tankage. Even when these plots were first started these materials were used extensively. Recent prices for these materials make their use prohibitive except for feed purposes. It is fortunate, therefore, that the original plans provided for treatments that could

later be used in determining the relative value of organic and inorganic forms of nitrogen in potato production.

Maintenance of Nitrogen

It is a well known fact that the inorganic forms of nitrogen are easily soluble in water and that in seasons of abundant rainfall much leaching of these substances may occur before the plants have an opportunity to utilize them. Furthermore, plants use nitrogen throughout their entire growth period. It is probable then that the amount of available nitrogen is the most important of the several fertility factors. The following table gives the yields of prime or marketable potatoes when 2,000 pounds of 7-6-5 fertilizer was used and when the nitrogen was supplied from the several sources named. This is given for the ranges receiving green manure and the one not receiving green manure.

Source of Nitrogen	Primes					
	1924 S I	1925 S VI	1926 S I	1927 S VI	1928 S I	1929 S VI
With green manure						
Nitrate, Soda	68	25	121	118	144	24
Sulphate Ammonia	88	37	154	145	163	49
40 Inorg., 60 Org.	145	26	174	152	200	55
50 Inorg., 50 Org.	146	27	167	162	200	74
60 Inorg., 40 Org.	133	20	167	170	168	63
70 Inorg., 30 Org.	170	25	155	158	226	46
Without green manure						
Nitrate, Soda	87	23	116	193	228	99
Sulphate Ammonia	97	33	140	175	189	86
40 Inorg., 60 Org.	89	31	165	204	200	142
50 Inorg., 50 Org.	57	41	152	199	193	133
60 Inorg., 40 Org.	88	48	131	226	181	167
70 Inorg., 30 Org.	107	36	146	225	194	159

Series I which receives green manure is situated adjacent to Series II which receives the same fertilizer treatment but no green manure crops. These two series may therefore be compared. Series VI is located on a sand hill and is included here to illustrate both a weather and a fertility factor, and also the hazards that attend cropping potatoes on similar soil situations.

Taking all comparable plots into consideration those receiving green manure lead twelve times out of the eighteen comparisons and tie in one case. For the plots

receiving part organic nitrogen and part inorganic nitrogen the green manure plots lead in ten out of twelve comparisons and tie one. When the nitrogen was all supplied by ammonium sulphate the results were in favor of the green manure plots in two out of three comparisons and for sodium nitrate only once in the same number of trials. The 70-30 mixture was best in each instance.

It is quite evident from these figures that the reserve nitrogen in the plots receiving part of the organic form is an important factor in the growth of the cover crops. Evidently the nitrogen supplied is nearly exhausted by the potatoes on the sodium nitrate and on the ammonium sulphate plots. It might be possible to maintain a satisfactory fertility level with the quickly soluble forms of nitrogen after sufficient organic matter in the soil is present but to date the evidence does not indicate that it is a safe practice. In fact the results in both 1925 and in 1929 are decidedly against such practice.

In years with abundant but well distributed rains and without heavy rains early in the season, very sandy land like Series VI may produce a satisfactory crop of early potatoes. Such a season was experienced in 1927. Both 1925 and 1929 seasons were not entirely favorable and none of the yields were satisfactory.

It should be noted, however, that there is an upward tendency in the fertility for all of these plots. It is only slight on the plots receiving soluble nitrogen but considerable on the plots receiving some organic nitrogen and green manure. The same may be said for the non-green manure plots, but again on those plots receiving the soluble forms of nitrogen (nitrate of soda and ammonium sulphate) yields are not dependable in unfavorable years. It should be noted that the latter plots are on a sandy loam.

Phosphorus and Rate of Application

Although these experiments were not planned specifically for the study of the effect of phosphorus there are certain results in the application rates that cannot be en-

tirely explained by the quantity of nitrogen used. The rate of application frequently has the effect of giving results equivalent to the use of a different analysis. For example, 1,000 pounds of 14-12-10 should be equivalent to 2,000 pounds of 7-6-5. The increase for the higher rates of application are particularly noticeable as the tests continue which is a good indication that the residual affect of the phosphorus, and doubtless the potash also, is becoming apparent. These effects are given in table two.

Rate of Application of 7-6-5	Primes 1924 S-III	1925 S-V	1926 S-III	1927 S-V	1928 S-III	1929 S-V	Average Primes
1000 lbs.	39	32	103	151	93	100	86
2000 lbs.	126	37	143	217	170	212	151
3000 lbs.	130	40	178	253	182	237	170
14-12-10*	—	—	—	208	163	183	181
14- 6-10*	—	—	—	192	113	144	149

* Rate of application 1000 pounds.

In the last two items of the table the direct effect of the superphosphate may be noted. The average difference for the three years is 32 bushels. This increase may be ascribed entirely to the balancing effect, i. e., the removal of the limiting factor, but it also indicates that the amount of superphosphate as used in a 7-6-5 mixture probably is the minimum that may be utilized as a maintenance supply in profitable potato production.

Potash

The potash studies in these potato fertilizer tests have been in progress for three years. They include forms of potash (manure salts, muriate of sulphate) and proportions within the analysis. The checks in the potash series carry the same amount of nitrogen and superphosphate as the other plots—the potash only is omitted. Table three gives a summary of these results.

Kind and Amount of Potash Used in Potato Production

Analysis and Form of Potash	Bushels of Primes 1927 S-I	1928 S-III	1929 S-I	Average 6 tests, 3 years
7-6-5 M. Salts	207	167	220	196
7-6-5 Muriate	226	186	229	214
7-6-5 Sulphate	205	175	206	196
7-6-10 M. Salts	231	152	213	163
7-6-10 Muriate	235	183	198	200
7-6-10 Sulphate	209	191	132	177
7-6-0	102	96	81	93

There are several outstanding comparisons from the potash series in so far as the potato yields are concerned. First, the muriate plots consistently outyield all other forms of potash in the series, the manure salts being second and the sulphate last. Second, the higher rates of potash, especially after the first year, do not produce increased yields. Finally, the need for potash in these soils is amply demonstrated as shown in the last set of figures.

Concentrated Fertilizers

Our tests have not gone far enough in the use of concentrated fertilizers on potatoes to warrant drawing conclusions. In the first year of these tests, however, the results have been in favor of the less concentrated mixtures both from the standpoint of total yield and the percentage of primes or marketable potatoes. It should be noted also that 50 per cent of the nitrogen in the non-concentrates was supplied in the form of organic nitrogen.

Early Harvested Late Potatoes

Late variety potatoes which are harvested in late August and September are usually planted in the late spring. They are grown under these conditions for most part in the western counties of Maryland. Usually the potato area forms a part of a rotation with small grains and legume crops. Bulletin number 287 gives detailed information on the effects of fertilizers on the crop when grown under Western Maryland climatic conditions. Summarized briefly, the nitrogen should vary from 2 to 4 units depending upon the amount of manure used in the rotation. The phosphorus from 8 to 12 units and the potash from 6 to 10 units. This suggests such analyses as 3-8-8 and 2-12-6 with manure and legumes and 4-12-8 on the less fertile soil. This is a 1-3-2 ratio.

Late Potatoes

Late potatoes are grown in eastern and east of central Maryland. They are planted during the last week of

June and the first week in July. Planting at this late date permits tuber formation in the autumn after the soil and air temperature is lowered from the extreme of mid-summer. Since both temperature and moisture are favorable for vegetative growth there is some danger of the crop not maturing before early frosts in October.

With this in mind the nitrogen used in a late potato fertilizer should be held at the minimum. Doubtless 2 units is sufficient on good soil. The phosphorus should be relatively higher, about 12 units. The potash will vary somewhat according to the soil. On the coastal plains about 8 units should be used and on the Piedmont, especially on the Chester and Manor soils, 4 to 6 units should be sufficient. The analyses that could be used most widely would be 2-12-4 and 2-12-8. On land less fertile than is recommended for potatoes it would be best to use a 4-12-8.

General

There are two general principles concerning soil fertility and crop production that should be observed especially in potato production.

First, the time of planting, that is, the kind of crop whether early or late or mid-season, should determine both the analysis of the fertilizer and the amount to use.

Second, potatoes should be grown in a regular rotation in which legumes are an important part. Under these conditions it is possible to select a fertilizer analysis and a rate of application which will fully maintain the necessary level of fertility in the soil.

PASTURE FERTILIZATION

BY J. B. ABBOTT

Always there seem to have been two schools of thought among men who are interested in improving the fertility of soil so that it will produce larger yields. The one school has held that the proper method of approach is to study the soil and determine, in order, its several weak-

nesses and apply treatments designed to correct those weaknesses and raise the general level of fertility high enough so that any ordinary crop will thrive without specific fertilization. The other school has held that this view point is more or less idealistic and impractical and that better, or at least more profitable, results can be secured by placing somewhat less dependence upon permanent, year in and year out maintenance of a high degree of fertility, important though it is, and more emphasis upon specific treatment of individual crops for immediate results.

That problem, in one of its many phases, arises at once in connection with pasture fertilization. We have, on the one hand, men who seek a method to improve or reclaim all of the so-called pasturage which is not now satisfactorily productive; and on the other hand, men who feel that, from the practical standpoint, the problem is solely one of producing at least cost, or in any event at low cost, without any necessary relationship to pasture land reclamation and improvement, sufficient grazing for the amount of livestock which it is desired to keep.

I have no desire to become involved in any controversy by espousing either viewpoint to the complete exclusion of the other, but I do believe that, as a matter of profitable farm management and sound economics, it probably is wiser to approach the problem from the standpoint of producing the desired amount of feed rather than from the standpoint of reclaiming a lot of unproductive land, much of which probably cannot now be reclaimed at a profit any way.

It is, of course, a self evident fact that the cheapest possible feed comes from exploitation of the natural pasturage of new lands. With the opening up to settlement during the past century of vast areas of grazing lands and the concurrent development of modern systems of packing, refrigeration and transportation, the centers of production of beef animals and sheep have shifted from the older and more populous agricultural regions to those of newer regions. Doubtless other factors than cheap

feed in, and good transportation from, the newer regions have been influential in that shift, but other than recognizing that some other factors do exist and that they have had some influence we perhaps do not need to take time to discuss those other factors now. Whatever importance may attach to them, they certainly do not obscure the importance of cheaper feed in the newer grazing regions as one of the major factors responsible for the shift.

It is, I think, to be presumed that, so long as exploitation of natural pasturage continues to produce as much meat and wool as the world requires, the bulk of the meat and wool will continue to be produced in those regions where existence of natural pasturage makes the feed cost lowest; and at a cost so low that few if any farmers in the older agricultural regions can afford to compete. That, in fact, has been the history of beef and sheep production during the past half century or so. Nor do I believe that fertilization of pastures in the older agricultural regions is at the present time a remedy for the situation so far as beef and sheep production are concerned, since animal nutrients, as I shall point out later, almost invariably cost more per pound in fertilized pasture than in natural pasture which is being exploited without incurring any cost for maintenance of productivity. But with the milking dairy cow the situation is different. Our urbanized modern civilization requires a tremendous amount of fresh, sweet milk and thus far it has proven more satisfactory and cheaper to produce that milk comparatively locally, despite high feed costs, than to produce it in far distant regions of lower feed cost and stand the expense and deterioration incident to transportation.

Two generations ago single townships in some of the northeastern States contained more sheep than the whole State now contains, and probably more beef cattle also, but there has never been a time when the dairy cow population of the northeast as a whole was larger than at the present time. The cow seems destined to be with

us for a long time yet and the problem which we have to solve is to secure, as economically as possible, a supply of feed adequate for the number of cows which it is necessary to keep to supply our local demand for fluid milk.

The current practice is to utilize such pasturage as exists and resort to manger feeding of hay, silage, soiling crops and concentrates to make up the deficit; but that that practice is unsatisfactory because of very high cost is a matter of common knowledge. Consider for a moment the relative costs of pasture and manger feeding. One hundred dollars worth of land or less—usually less—will pasture a cow for a grazing season of 150 days. The annual cost of carrying that land, including interest, taxes and fencing, amounts to about $9.00, or six cents per cow-day. Roughage, on the other hand—either hay, silage, or soiling crops—to be manger fed in place of pasture costs from 20 to 30 cents per cow-day.

In New York some years ago it was found, as the result of survey of five or six typical dairy farming areas, that the average value of the product per cow-day in the six summer months was 34 cents. In the six winter months it happened to be exactly the same. The feed costs for the six summer months, including both pasturage and supplemental feed, amounted to about ten cents per cow-day, leaving a balance on the right side of 24 cents per cow-day; but in the six winter months the feed cost amounted to 38 cents per cow-day leaving a deficit of 4 cents per cow-day.

Evidently those dairy farmers—and I have reason to believe that they are typical of the whole northeastern fluid milk region—would have been very badly situated indeed without the profit which they derived from their pastures. And being without pastures—at any rate without good pastures—is exactly the situation which confronts us as a rather immediate eventuality. This problem, of course, has not yet become so acute in the regions naturally endowed with strong soils as in regions with less strong soils, but even there it begins to appear as a problem. Pastures no longer start up so early and

so vigorously in the spring as they formerly did; they suffer more quickly from drought and they recover less rapidly afterward. They carry less stock. Stock comes to the barn in the fall in poor condition—a serious matter in the case of all stock but especially serious in the case of the milking cow as it restricts her production during the late fall months when milk is in greatest demand and necessitates several weeks of very heavy barn feeding to build her up to a condition where she can really produce.

So far as dry stock and young stock are concerned the problem of short pasturage usually can be and usually is solved by renting or buying mountain pasture, abandoned farm land, or something of the sort, usually, of course, at some distance from the homestead. And however much we may deplore the practice of exploitation and exhaustion of the fertility of the soil, the hard fact remains that that practice yields the cheapest feed and probably will be continued.

But with the milking herd the situation is different. The cows must be milked twice a day and in consequence are in range to such pasturage as exists within working distance of the milking stable. Milking cows have to eat, regularly and abundantly, and if there is not sufficient grazing within working distance of the stable there are only about four possible alternatives: keep fewer cows, partially starve the cows, manger feed the cows, or improve the pasture. Buying additional land, which might be the cheapest solution of the problem if the land were available, usually is not a feasible solution of the problem on account of lack of available pasture land of suitable quality within working distance of the milking stable.

The first alternative which I mentioned, keeping fewer cows, usually is objectionable because it decreases the volume of business done and the possibility of profit and also fails to provide a means of marketing the feeds normally produced on tillage land for winter consumption. The second alternative, half starving the cows for half the summer, is, I regret to say, far more popular than it

deserves to be. The third alternative, manger feeding, was very popular—probably deservedly so—during the bygone era of cheap feeds and cheap farm labor but seems to be declining in popularity among thinking farmers with the ever-increasing cost of concentrates and of farm labor. The fourth alternative, improvement of the pasture, is gaining in popularity by leaps and bounds, particularly since it has come to be realized that, as compared to pre-war levels, fertilizer is one of the cheapest of farm supplies.

Many men, however, look at the cost and hesitate. It looks like an additional expense and they know full well that their business is not in a condition to stand many additional expenses. And it *is* an additional expense as compared to the expense of the man who has sufficient natural pasturage; but that is not the comparison which should be made. Adequate natural pasturage, as already pointed out, simply does not exist within working distance of the stable, so the true comparison is with the cost of the supplemental manger feeding which is necessitated by shortage of pasturage.

The question is this: with more feed needed during the normal grazing season and additional pasture land suitably located and of suitable quality not available, can that additional feed be secured more cheaply by some system of manger feeding or by improving some of the existing pasture land? And the answer, I think, is that at least a part of the additional feed can be secured at far less expense by fertilizing the more responsive portions of the existing pasture than in any other way.

Two years ago Mr. R. A. Payne of the N. V. Potash Export My. and I undertook seven pasture top-dressing tests in Massachusetts, Vermont and New Hampshire. The results were so encouraging that we suggested to those Fertilizer Materials Houses who maintain staffs of agronomists that it be taken up as a joint enterprise in the season of 1929. The suggestion was adopted by:

The American Cyanamid Company
The Barrett Company

The National Fertilizer Association
The N. V. Potash Export My.
The Superphosphate Institute
The Synthetic Nitrogen Products Corp.

Our first step was to plan a simple comparative test to be carried out upon a uniform basis by several co-operating companies, except as to source of nitrogen.

The plan of this test was envolved with the ideas in mind (1) that shortage of plant food is the limiting factor in the case of most of that pasture land which now yields less than it formerly did; (2) that applications of plant food will have to be rather liberal in order to overcome the bad effects of a hundred years or more of neglect, and raise the level of fertility to a point where the desirable species will thrive; (3) that the first problem is to determine what plant foods are required to produce the desired response; and (4) that the cost of the heavy manger feeding of dairy cows which is necessitated by short pasturage is so great that dairy farmers can go to a much larger expense for pasture improvement than has been generally recognized by either farmers or agronomists and still be way to the good financially on account of the resultant saving in manger feeding expenses.

In further elucidation of this fourth point it may be remarked that, in marked contrast with beef stock, sheep, dry stock, and young stock, the milking dairy cow not only is restricted to such pasturage as exists within working distance of the milking stable but at the same time is in so much greater need of a regular, full and adequate ration every day in order to maintain milk flow as to render manger feeding an immediate necessity in case of any deficiency of grazing. In effect, he who fertilizes pasture for beef stock or sheep is competing with exploitation of the natural pasturage of the world while he who fertilizes pasture for a milking dairy herd in the milk shed of Boston, New York or Philadelphia, for example, is competing only with the manger feeding costs

which he otherwise necessarily must incur to supplement limited pasturage.

There is, of course, every possible gradation between these extremes, but in general it would appear that the economics of the situation are such that intensive, high cost per acre fertilization of pastures for milking herds, in the fluid milk regions is virtually certain to be satisfactorily profitable long before even the most expensive, low cost per acre fertilization of pastures for beef stock appears above the economic horizon at all.

Consequently this test was designed especially to fit the permanent pastures of the predominantly fluid milk regions of the Hay and Pasture Belt to the north and east of the Corn Belt. Obviously in other regions the problems of pasture improvement present themselves in quite different economic and agronomic aspects and somewhat different methods of attack would seem to be indicated.

The plot arrangement and treatment of the standard test was as follows:

Check Plot
Untreated

P Plot
1000 pounds per acre 0-10-0*

LP Plot
1000 pounds per acre 0-10-0 and lime

LPK Plot
1000 pounds per acre 0-10-10 and lime

LNPK Plot
1000 pounds per acre 5-10-10 and lime

Each plot was two by eight rods in size, making 1/10 acre. Cattle were fenced out of one end of each plot from the start so that growth response could be observed and determined by mechanical harvesting and

* The figures refer to percentages of nitrogen, phosphoric acid and potash, respectively. The nitrogen was derived from either ammonium sulphate, calurea, cyanamid, nitrate of soda or any mixture of them. The phosphoric acid was derived from superphosphate, usually 16%. The potash was derived from muriate of potash. The lime used was either 2000 pounds per acre of hydrate or 3000 pounds per acre of carbonate.

chemical analysis. Field men were given the following suggestions relative to handling these tests:

Locate plots on pasture land which is reasonably free from brush, reasonably well supplied with moisture, and not exhausted to the point where the desirable species of pasture plants have completely disappeared.

In general, select land which once grew good pasturage and avoid like a pestilence land which never did. Avoid especially land which existing vegetation marks as excessively droughty.

Apply the fertilizer early.

All together, including a number of standard tests initiated by extension men, we started about 150 tests last spring. We now have yield records from 115 of these tests in 15 states and the Province of Ontario. Of these, 103 are reported on a strictly comparable basis so I have averaged them. In view of the fact that these tests, except seven, cover but one year, I do not feel warranted in drawing fine distinctions nor do I wish to base any conclusions at all solely on the result of these tests. About all that I feel warranted in doing is to point out certain indications and especially to call your attention to the promise which proper pasture fertilization seems to hold out in the direction of reducing feed costs.

Effect of Each Treatment Upon Cost of Dry Matter and Protein—$80.00 Land

	Check	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Fixed Charge per acre	$6.00	$6.00	$6.00	$6.00	$6.00
An. Cost per A. Treatment	——	2.33	4.53	6.53	15.03
Total per A.	6.00	8.33	10.53	12.53	21.03
Cost per Cwt. Dry Matter	.59	.59	.68	.67	.84
Cost per Cwt. Protein	3.53	3.60	3.95	3.64	4.31

Cost of Dry Matter and Protein in Feeds Commonly Used to Supplement Short Pastures

	Clover-Timothy Hay at $20.00	Silage and Soiling Crops at $7.00	24% Protein Dairy Feed at $50.00
Cost per Cwt. Dry Matter	$1.14	$1.40	$2.77
Cost per Cwt. Protein	11.63	17.50	10.41

In the case of the *most expensive* pasture treatment on $80.00 land the costs per Cwt. were Dry Matter, $0.84 and Protein $4.31.

As already pointed out, nutrients usually cost more on fertilized than on unfertilized land; but they cost far less on fertilized land than in manger feeds. With sufficient good pasture land within working distance of the stable not available and manger feeding the usual alternative this fact becomes of great practical importance as a means of reducing feed cost.

It is cheaper to grow feed in a fertilized pasture and send the cows after it than to grow it on tillage land and send a man and team after it.

Average Dry Matter Yield 103 Pasture Top Dressing Tests in 15 Northeastern States and Ontario

	Check	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Pounds dry matter per acre	1051	1392	1548	1850	2501
Pounds increase over check		341	497	799	1450
Pounds increase each successive added material		P 341	L 156	K 302	N 651

(Fertilizer ½ ton per acre)
(Lime 1 ton per acre)

Yields were determined by harvesting square yard areas with shears at pasture stage—3 to 5 times during the season—and submitting the harvesting material to Prof. P. H. Smith, Official Chemist, Feed Control, Mass. Exp. Station, Amherst, Mass.

Average Dry Matter and Protein Yield 103 Pasture Top Dressing Tests in 15 Northeastern States and Ontario

	Check	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Pounds Dry Matter	1051	1392	1548	1850	2501
Per cent Protein	16.3	16.9	17.2	18.6	19.5
Pounds Protein per acre.	171	235	266	344	488
Pounds increase over check		64	95	173	317
Pounds increase each successive added material		P 64	L 31	K 78	N 144

Perhaps the most striking feature of these results is the relatively large increase in both dry matter and protein in the case of

the last two plots as compared with the plots which received only phosphoric acid or phosphoric acid and lime. One might conclude, from the frequency with which those treatments have been recommended, that pasture soils need little other than phosphoric acid and lime; but these results do not lend much support to that view.

The failure of phosphoric acid alone to give a really satisfactory response should not be interpreted as meaning that pasture soils do not need phosphoric acid but rather that most of them seem to need something else with it.

Early vs. Late Spring Top-Dressing of Permanent Pasture

	Pounds Dry Matter Per Acre				
	Check	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Ave. of all tests					
Early Ave. App.	1051	1392	1548	1850	2501
Ave. of 10 tests					
Late Ave. App.	1118	1169	1382	1540	1809

Early means late March and early April—late means May.

Early Response from Complete Fertilizer and Lime

Average Yield Green Weight per Acre Last of May

	7 Vt. Tests	6 Ill. and Wis. Tests
5-10-10 and lime	7682 pounds	7202 pounds
Check	1120 "	2534 "
Increase	6562 "	4668 "

The "early bite" to tide over the difficult period "between hay and grass" is worth to the dairy farmer what it saves in barn feeding expense plus what he gains in increase production and usually amounts to enough to pay for the fertilizer before the middle of June.

Estimated Acre Cost of Treatments

N	$3.00 per unit
P_2O_5	1.20 " "
K_2O	1.20 " "
Lime	10.00 " ton

	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Initial Cost	$6.00	$16.00	$22.00	$29.50
Labor Applying	1.00	2.00	2.00	2.00
Est. An. Cost	2.33	4.53	6.53	15.03

(N 1 yr. P_2O_5 and K_2O 3 years. Lime 5 yrs.)

These costs should not be taken as accurate to the cent or even to the dollar as no one knows for certain how long the several treatments will last and, of course, both fertilizer and lime costs vary in different localities. They are believed, however, to constitute a fair approximation.

Effect of Each Treatment Upon Cost of Dry Matter and Protein—$20.00 Land

	Check	0-10-0	0-10-0 Lime	0-10-10 Lime	5-10-10 Lime
Fixed Charge per acre	$1.80	$1.80	$1.80	$1.80	$1.80
An. Cost per A. treatment	——	2.33	4.53	6.53	15.03
Total per A.	1.80	4.13	6.33	8.33	16.83
Cost per Cwt. Dry Matter	.18	.29	.42	.46	.67
Cost per Cwt. Protein	1.05	1.75	2.40	2.42	3.44

GRASS AND LEGUME MIXTURES FOR PASTURES

BY GEARY EPPLEY

Pasturing is the natural method for feeding animals, and pastures have always furnished the major portion of the animals' ration. In the primitive days the first domestic animals obtained their entire sustenance from the grass lands; today, in this period of intensive agriculture, according to Piper, one-half of the feed for all the animals of the United States is furnished by pasture.

Even though pastures have been and still are the most important source of the animals' food, they have received very little attention. There is often considerable talk about pastures, but a search of the literature shows very little experimental work on pastures in our country (Story).

In the last decade there has been quite an awakened interest in this phase of agriculture. The Experiment Stations throughout the country have come to realize the lack of experimental evidence upon which to base pasture recommendations, so that now we are all carrying some pasture experiments.

The conducting of a thorough pasture experiment is difficult and involves a large expenditure of money and the use of a large area of land, which two factors, as you know, are not usually plentiful at State institutions. However, we, at Maryland, are running such tests as we can in order to add to the general field of knowledge concerning pastures.

The experiment upon which I am going to report this morning is one started in 1924 to test the durability of grass under actual pasture conditions.

In the county of Allegany on the farms of Mr. R. C. Wilson, Rawlings, Maryland, and Mr. Ward Wilson, Flintstone, were planted two similar series of grass plots. The plots at Rawlings were on a Holston silt loam being land of average fertility; the plots at Flintstone were on a DeKolb shale loam which is a light flaky soil. The natural grass growing on it was poverty grass and broom sedge. In other words, it was poor grass land.

These plots were seeded to various mixtures and combinations of the following grasses, all of which grasses are found in the commercial pasture mixtures purchased from seed houses: Kentucky blue grass, orchard grass, redtop, timothy, tall fescue, red fescue, tall oat grass, meadow foxtail, sweet vernal grass, English rye grass, Rhode Island bent.

These plots were seeded in the spring of 1924 and fenced during the first summer. The cattle were turned upon them in the spring of 1925. Observations were made and the per cent of grass in the stand on each plot was estimated in September, 1925, and July, 1926. Estimates of per cent of mixture were also obtained on the Rawlings lots in September, 1929, the farm at Flintstone having been sold.

In September, 1924, at College Park on a Leonardtown silt loam which was in a high state of fertility, there was seeded another series of pasture plots. These plots are located near the dairy barn, and kept pastured close during the season of 1925 by yearling heifers and thereafter by mature cows.

In this series of plots Kentucky blue grass was seeded with orchard grass, English rye grass, meadow fescue, meadow foxtail, timothy, and redtop. The next five plots were similar to the first five, except redtop replaced the Kentucky blue grass. In each of these plots there was seeded three pounds of alsike and three pounds of white clover. Plot 12 was seeded to just blue grass and white

clover, and the next four plots were seeded to English rye grass, orchard grass, redtop, and Kentucky blue grass at varying rates.

Observations were made on these plots the same as on the Allegany plots.

Now I will give briefly what the observations from these experiments disclosed.

Orchard grass established itself rapidly and by the second season predominated over all grasses with which it was grown in competition on both fertile heavy soils and on unfertile shale soil. However, after a period of five years on the Holston silt loam blue grass and red fescue largely replaced it. On a Leonardtown loam under milder conditions Kentucky blue grass had only slightly replaced the orchard grass which still predominated after four years.

Red fescue was slow to establish itself, especially on the fertile soil, but was one of the predominating grasses on the poor soil, and after five years of pasturing furnishes some good sod on the Holston silt loam.

Redtop might be classed as a fair grass only in all respects. It is not a particularly quick grower, and did not completely eliminate any of the other grasses, also the sod formed was very poor. It was more aggressive on the light shale soil than blue grass.

Sweet vernal grass was used on two plots only and as was to be expected, it predominated over blue grass and English rye grass on the light shale soil. Sweet vernal grass is one of those grasses we find on gravelly hills and thin places in the pasture.

English rye grass proved to be one of the quickest grasses to establish itself, but it was quickly crowded out by other grasses. At College Park the Kentucky blue grass has nearly crowded out the English rye grass, but the redtop has not been so successful.

Meadow foxtail and meadow fescue, two other pasture grasses in the test, did not show any merits.

Kentucky blue grass was particularly slow in establishing itself, especially where it was in competition with

other quick growing grasses. However, one of the most interesting points brought out in this experiment was that when Kentucky blue grass was seeded with just clover or with meadow foxtail, a particularly slow growing grass, it established itself rather rapidly, and a good sod was ready for pasturing as soon as from the mixtures. This occurred on both the Holston silt loam and on the Sassafras silt loam. Also these plots have had the best piece of sod throughout the experiment.

The experiments in Allegany County showed also that the blue grass was a total failure on the shale soil, but on the Holston silt loam it established itself in the mixtures slowly and after five years predominated over all the grasses except red fescue. It even worked into plots where it was not sown.

At College Park it has gradually replaced all other grasses except orchard grass and even in the orchard grass—blue grass plots it is increasing in percentage. However, from these experiments it is evident that orchard grass should not be used in mixtures where the ultimate end is a blue grass sod because the orchard grass retards the blue grass more than does any other grass, with the possible exception of red fescue. The best sod was obtained on those plots where Kentucky blue grass was the outstanding grass.

The so-called "top grasses," that is, timothy, tall meadow oat grass, and tall meadow fescue, responded as expected. They establish themselves rapidly but soon disappear. Although these three grasses are not suitable for permanent pasture they form an important part of the seed mixtures for pasture, because of the ease with which they give a stand the first year at the same time do not produce excessive shade which hinders the growth of the slower growing grasses.

In selecting grasses for pastures it is necessary to consider them for palatability from the animal's standpoint, as well as from the viewpoint of obtaining a large amount of herbage. When the animals were turned upon the

plots at College Park after their romp they invariably started grazing on the Kentucky blue grass plots and orchard grass plots, and avoided the redtop. In all the series of plots the blue grass plots were grazed to the ground and the redtop plots were let grow. In fact, it was astonishing to see the way the animals would clean up either Kentucky blue grass or orchard grass and leave adjacent plots of redtop standing.

From our experiments it appears that Kentucky blue grass and orchard grass are our two best permanent pasture grasses. Red fescue and redtop while very durable are not particularly palatable but are important under conditions that are adverse to the afore-mentioned grasses. Then in making a pasture mixture one of the above grasses should form the basis and be supplemented with such other grasses as conditions warrant.

In Maryland the basic pasture grass should be Kentucky blue grass on any heavy soil that is average in fertility. With this should be seeded a quick growing grass and the outstanding pasture legume, white Dutch clover, also some alsike clover for immediate results which would give the following mixture for an acre of land:

Kentucky blue grass	10 to 15 pounds
White Dutch clover	3 "
Alsike clover	3 "
Timothy	8 "
or	
English rye grass	10 to 15 "

The expensive part of this mixture is the Kentucky blue grass and white clover, which are the two plants most desired. The amount of blue grass may be varied with what one can afford to expend for seed, but the greater portion used the quicker the blue grass stand will be obtained. There is another important point to remember, namely, that alsike clover seed that contains white Dutch clover as an impurity may be purchased at a lower price than pure alsike. The white Dutch clover is of course one of the desired elements of the mixture.

For heavy soils that are low in fertility and on light soils the following mixture is recommended:

Orchard grass	14	pounds
Alsike clover	4	"
Timothy	8	"
or		
Tall oat grass	14	"
Redtop	3	"

On sandy soils the tall oat grass should replace the timothy. The legume should be six pounds of Japan clover.

A mixture for gravelly hills:

Orchard grass	10	pounds
Sweet vernal grass	10	"
Sheep or red fescue	6	"
Tall oat grass	10	"

The legumes for such a mixture are quite a problem but some results should be secured from eight pounds of white sweet clover, or four pounds of yellow trefoil, or six pounds of Japan clover.

We do not have any experiments to base recommendations on for wet land, but the following mixture should give good results:

Redtop	8	pounds
Alsike	6	"

These recommendations that have just been given are not iron clad, and may be varied with local conditions and the cost of seed, but the basic grasses should be used under their particular conditions.

THE ECONOMY OF PERMANENT PASTURES

Talk made by T. K. WOLFE, Editor, *The Southern Planter*, Richmond, Virginia, before the Maryland Crop Improvement Association, Baltimore, Maryland, January 9, 1930

The important place occupied by pastures is seldom realized by livestock raisers. Too often pastures are really nothing more than exercise lots, so small is the amount of feed produced per acre. Not until the values

of good pastures are more highly appreciated can livestock production, except under favorable circumstances, become profitable. It has been estimated that nine-tenths of the feed consumed by animals is forage including pasturage, hays, etc. Harvested forage supplies one-half of that eaten by livestock, and pasturage the other half. It should also be borne in mind that pasturage costs less than one-fourth as much as would the same amount of feed harvested. In fact, pasturage is the only large supply of really cheap feed available to livestock men.

Too frequently attempts are made, and more frequently advice is given, to start or expand livestock production before sufficient home-raised feed is provided. It is poor policy. The production of feed must precede the securing of livestock. Except under unusual conditions, livestock produced entirely on bought feed can not successfully compete with livestock produced largely on home-raised feeds, especially roughages including pasturage.

Good Pastures Profitable

Permanent pastures—those that are allowed to remain for an indefinite length of time—constitute approximately four-fifths of the total acreage of pastures. It requires a relatively long time and large initial expenditure of money to develop good permanent pastures. However, when the relatively long life of such pastures is considered, the average yearly expense is small.

The bad repute into which pastures have so often fallen is due to the practice frequently followed of farming land to cultivated crops so long as they can be profitably produced and then turning the land into pasture. The land becomes poor and unproductive. Such a practice is not conducive to obtaining good pastures. Good grass land is rich land. Most good pastures are found on land that was naturally rich to start with and has been kept productive by manuring, fertilizing, liming, etc. If pasturage is looked upon as a crop and good methods followed in handling it, the best land of the farm can be just as profitably, and in many instances

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more profitably, used for producing pasturage as for the growing of rotated crops.

Pastures Give Higher Returns Than Cultivated Crops

Added interest is being taken in the production of pasturage at the present time. One of the reasons is the high cost of producing cultivated crops and the difficulty in obtaining competent labor for farm work of all kinds. Anything that will reduce the cost of production of farm commodities and eliminate the labor difficulties is likely to find favor with farmers. Dairying is generally profitable. However, in connection with profitable dairying a large quantity of rotated crops is harvested and fed. In pasturage farmers should find a means of eliminating a portion, at least, of the harvested crops. In fact, it has been suggested that the area in improved pastures in the Eastern United States be increased by 30,000,000 acres. It is suggested as a possible remedy for overproduction of some of the staple crops. It would serve the double purpose of preventing surpluses and at the same time put the land to a profitable use.

It is not the purpose of this article to discourage the use of harvested crops in feeding livestock, but simply to show the important place really occupied by pastures.

New York Results

In New York, the results of surveys reveal that the cost of maintaining pastures was generally from 7% to 8% of the value of the land, or from $1.45 to $2.95; and the cost of maintaining crop land average 7.6% or $5.77. The average returns per acre from 81,683 acres of pasture land on 1,134 farms was $11.37; the average returns from crops above the cost of production was 61 cents per acre.

The returns from milk production, when the cows were kept on pasture and given supplementary feeds, were compared with those secured when the cows were fed during the winter entirely on harvested feeds. The

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cost of pasturage per cow was found to be 5.4 cents per day per cow and of supplementary feeds 4.3 cents per day, or a total daily cost per cow of 9.7 cents. The returns per cow per day from milk was 34 cents or 24 cents above feed costs. The cost of winter feeding was 38 cents per day per cow and the daily return from milk per cow was 34 cents; or 4 cents per cow per day below feed costs.

Pasture land is generally given a much lower value than land which grows rotated crops. The ordinary pasture land is worth less. However, good pasture land has relatively a high value. It was stated in connection with the New York surveys, "Pasture is such a productive feed and so cheap that the returns from it make the value of pasture land appear to be under-estimated."

In view of the above facts, "pasture land is more remunerative than crop land, especially on farms where no intensive cultivated cash crops are grown, but both must be used together."

Pennsylvania Results

In Pennsylvania a well fertilized bluegrass pasture is capable of producing three times as much digestible crude protein and more total digestible nutrients than is produced by an equal area of a grain rotation consisting of corn, oats, wheat and grass—both on soil of equal fertility. The economy of pasturage feeding is evidenced by the fact that to produce one ton of digestible crude protein in the grain rotation involves a labor cost of $178 as compared to $2.82 in case of the pasturage. The labor cost of one ton of total digestible nutrients in the grain rotation was $15.94 and in the pasturage 66 cents.

In the case of silage corn, four acres yielding 37.2 tons, the labor cost of production would be $106.04. The total digestible nutrients would be produced at a labor cost of $21.21 a ton as compared to 66 cents for the pasturage.

Department Findings

The value of pasturage in supplementary other feeds is not properly appreciated by most livestock growers. The foregoing results indicate that its value is much greater than is popularly believed. The results of surveys by the United States Department of Agriculture also indicates that the value of pasturage is under-estimated. In studies made "concerning the requirements for the production of market milk, pasturage furnished very nearly one-third of the total sustenance for the cows. On these same farms the pasture cost was only one-seventh of the total feed cost." Their records, in the case of beef cattle, showed that the breeding cows obtained their entire living from pasture for 200 days and from roughage and concentrates for 165 days. The total annual feed bill for these cows was $24.00 of which pasture constituted $8.50. In other words, pastures which were furnishing a little over half the total sustenance were credited with only one-third of the feed bill."

"Farm pastures are generally contributing more of the total sustenance of livestock than the value assigned to them would indicate. Partly because of the low rental value generally assigned to pasture and also because many of the pastures, especially the mismanaged ones, do not produce as much feed per acre as when crops are grown on the land, there is a tendency to believe that pastures which are arable should be plowed up and put into crops. Many persons, however, do not take into consideration the much greater expense attached to the growing of crops. Unquestionably, there are conditions under which arable pasture lands should be put to more intensive use. On the other hand, there are also conditions where some of the crop land should be in pasture."

Other Results

The value of good pasturage in supplementing harvested feeds is further evidenced by fertilizer top-dressing tests on pastures on 72 farms in ten states by the Nat-

ional Fertilizer Association in 1929. The results show "that the cost per pound of dry matter on the best fertilized plots was only about 40 to 60% as much as the cost of dry matter in the form of clover hay, corn silage, or soiling crops and 25% as much as the cost of concentrates."

Improvement Of Pastures

The productivity of pastures can in most cases be profitably increased. Especially is it true where high producing animals or animals which should make large gains are pastured. Contrary to common belief, pasture lands are decreasing in fertility in most instances. Numerous experiments have yielded results which show the great benefits to be derived from the use of fertilizers, manure, and lime.

In Ohio, the applications of lime and superphosphates increased the yields of pastures from 100 to 400% in many cases. In Connecticut superphosphate alone increased the pasturage 64%; superphosphate and limestone, 120%; superphosphate and potash, 86%; superphosphate, limestone and potash, 128%; superphosphate, potash and nitrate of soda, 103%.

"With cloverhay at $18 and corn silage at $6 per ton, the value of these feeds replaced by one acre of unfertilized pasture * * * averaged $13.50 during the five years, 1924-1928.

"On the same basis as above, and distributing the cost of the fertilizers over five years, pasture receiving superphosphate returned $10.10 per acre per year more than the untreated land, at an annual cost of $1.30; limestone $5.28 per acre per year at an annual cost of $2.00. * * *."

In Virginia, it was found that steers grazing on a bluegrass pasture fertilized with superphosphate at the rate of 300 pounds per acre three times during a 4-year period gained a total of 632 pounds more during the period than steers grazing on unfertilized land. The increase from the use of manure, 10 tons per acre once during the four years, was 468 pounds. In this experiment, for each two

cents spent for superphosphate the steers made a gain of one pound.

The National Fertilizer Association found in 1919, from extensive fertilizer top-dressing tests with pastures that the best fertilizer application produced, "equivalent to something over 1,200 pounds of 22% protein dairy feed worth about $30 at present prices. The annual cost for the treatment over a period of years is estimated at $13.50 per acre."

Pastures Have Important Place

The actual facts in the case show that pasturage is a very cheap source of feed; that crop land can in many instances be more profitably placed in pasturage than farmed to cultivated crops; that pasturage is an excellent supplement to harvested roughages and concentrates, and that it pays handsomely to fertilize pastures to increase their production.

REPORT

of the

TWENTY-THIRD ANNUAL MEETING

of the

Maryland State Dairymen's Association

THURSDAY MORNING

January 9, 1930

BALTIMORE, MARYLAND

The Annual Meeting of the Maryland State Dairymen's Association, held in the Ball Room of the Hotel Lord Baltimore, Baltimore, Maryland, convened at ten forty-five o'clock, President R. S. Snader presiding.

PRESIDENT SNADER: The meeting will come to order. It seems like this morning we have too many meetings on. I was wondering where our dairymen were, and I went out to look for them and found the Crop Improvement meeting has forty or fifty of them, and the Poultry Association has a like number. We have got a faithful few here, and I don't see any reason for holding up this meeting, so we will proceed. It is unfortunate each year that these group meetings seem to break up—well, I don't exactly mean break up our meetings, but in order to draw from them it would break up their meetings. We will go on with our program, and we will give you dairymen who are here just the thoughts that we have this morning. If there are any questions in your mind, we will be glad to hear from you.

There may be some members here from the Washington and Virginia Associations also, and some from the Interstate Association. We are glad that you are here.

In our start-off meeting yesterday of the Farm Bureau, it appeared to me that that meeting started off with more snap yesterday than any meeting we have ever started off with since we had a Farm Bureau, and when you go around to these group meetings this morning you will find the people that are here are all interested, interested in their different projects, and they are getting from the trained men that are here, from the Government and Experiment Stations, getting results, getting things that they can carry back home and put into practice. Last night we had quite a number of dairymen at the stockmen's association down at the Union Stock Yards. There were about 150 of us. It was my first trip to the Stock Yards with the Stockmen's Association. They have been going out there for several years, but I never had the opportunity of going before. Last night I went. I was just utterly amazed to see what a crackerjack organization those stockmen have. They have got a real organization.

I know they come around and tell you what a wonderful organization the state dairymen have. But there are other organizations stepping right up behind us. The enthusiasm that was shown out there at that meeting last night was just amazing, and they are doing good work along their line.

My attention was called out there last night that the stockmen in growing their hogs, in growing their beef find the conditions have changed with them just as with the dairymen. Twelve or thirteen years ago when we came into this market and set up our organization you could market milk of most any quality, but as time has gone on we have had to base our price on quality. Quality is what we talk now. We have forgotten the price, because we feel that if we have a quality product it will always demand a price.

What has brought this about? The public has demanded a high quality, not only in milk, in their meats, in their vegetables and everything that is grown; the public has demanded that quality. In some of their talks out there last night on hogs they said the time used to be,

and I remember the time when I was a boy on the farm, when we fed a hog until it weighed 200 or 250 pounds. That is what the market was demanding. Times have changed. The light weight hog now brings the top price, and there is a secret in growing that hog. He must be fed a ration that will develop him in such shape that the packer knows when he sees that hog how he has been fed and what conditions he has been kept under.

So it is with the product of milk. The product of milk has just gotten to a stage where we must produce, of course, economically, and we as breeders of cattle must breed our cattle in such a way that we get the proper production, the proper amount of gallons, and also, we must not lose sight of the butter fat that is contained in that product. Our market, as you know, demands—in fact, our prices are based on a four per cent butter. Our health regulations here require a 3.5 milk, and our price is based on a four per cent butter fat. The consumers of our product here, which are the people that we have to look to in order to get rid of our product, the consumers of our product in this market have demanded high quality milk and a 4 per cent butter fat. They have demanded that; they have gone to the Health Department and they have made their demands that they are paying for a 4 per cent milk, and that is what they expect to get. So you see, gentlemen, it is not only in the milk industry, it is in all the products that are grown on the farm—hogs, sheep, cattle.

A change has taken place, and if you want to get the price for your product, it makes no difference whether it is milk, whether it is poultry, whether it is hogs, you must raise those things and make them of a high quality. The demand is quality at this time.

I am not going to take up so much more time in talking to you here this morning. I want to say that this is not our annual meeting. We had our annual meeting in August. This is our mid-winter meeting, which we hold in conjunction with the Farm Bureau, and we feel at this mid-winter meeting we have our producers come in here

and Mr. Heaps discusses conditions with you in a round table talk, and we derive a lot of benefit from this meeting. I know last year there were quite a number of points brought up which were discussed here in this meeting, and I feel that if there were any misunderstandings with our members, everybody went away and felt, "Well, that is a good explanation. I see it in a different light."

So in closing my remarks, I want to say to you dairymen, that since we had our annual meeting and you heard the financial report made at that meeting, our market at the present time is in good shape.

I want to call your attention to the fact that we have maintained our basic price right straight through, and as you men know that read the papers and watch the markets, there is a difference of 10 to 11 cents in butter to what there was a year ago. So you can see with our excess milk figuring on a butter price, that we have done very well in order to maintain that excess price, and you are getting today for that excees milk the same as you did a year ago and butter is 10 cents lower. You can see the way we have set up the plan that we have set up in Baltimore—that plan is the only reason you are getting for your excess milk No. 2 milk which goes into cream, the price you are getting.

I want to call your attention, too, producers, to just one more thought. I suppose you know it; that all markets over the United States, we find in attending our national meetings, have been flooded with milk. There is a general flood of excess products on all markets. That shows you that in the last few years quite a lot of people that were producing wheat and corn and hogs have turned their attention to the dairy business, because it was one thing that they could get a cash price for once a month to operate their business with.

I just want to call your attention to our market. Most of our markets have an excess of products on them, and have had for some time. Our Baltimore market, I want to say, is in very good shape. We have an excess, but

with our Secretary up here we have been able to take care of that excess at a price which is possible to you dairymen to produce for.

I want to say in closing, that being so near, so close to the beginning of the New Year, I want to extend to you dairy people the compliments of the season, wishing you a happy New Year and a prosperous year in 1930, as prosperous as we have had in 1929.

I thank you for this opportunity of having a word with you this morning.

Our next speaker on the program needs no introduction to you people, Mr. I. W. Heaps, Secretary and Manager of our organization, who will now talk to you on "Influence of Quality of Milk in Stabilizing the Market." Mr. Heaps.

ADDRESS

BY I. W. HEAPS,
Secretary and Manager

Folks, I have a topic this morning, but I haven't any prepared speech. I don't know whether that will go for an alibi or not, but I just haven't had time to think about it, and I think I will just talk.

While sitting there my mind drifted back along the lines of the age of the Maryland State Dairymens Association. I find that we are approaching the twelfth birthday in a very few months, and there have been many, many changes during that short period of time. There have been many changes in the marketing of milk in this market.

Twelve years ago there were 135 dairies, distributors, in this market. Today there are not over ten. Now, that is some change, if you just think about it. There were 135 different distributors holding permits to distribute milk in this market, and I can't count over ten today. That has been taking place right here in our market, and it has been taking place elsewhere.

There have been other things happened in the past twelve years, some very recently. We know that co-operative marketing has been the salvation of the Maryland farmer in the Baltimore milk shed. We don't think it is too much to make that statement. We have had in Congress for a number of years a question of legislation for the benefit of the farmer. But until recently we didn't get any legislation. I am not going into a discussion of the Federal legislation, because that was taken up yesterday, and most of you have read about it and know about it anyway. But we find in that legislation that Congress in the provision of that bill, and the Federal Farm Board as set up by Congress has recognized cooperative marketing as the cure for agricultural ailments.

Then we should at this time be more encouraged than ever in the cooperative efforts that we put forth in the marketing of our farm products. We have every encouragement to go forward along those lines. We find that not only have the distributors of milk in this market dwindled to a very, very few, but we find the same thing taking place in other markets.

We are today standing about where we were several years ago, as a rule, in cooperative milk marketing, while the distributors of our milk have seen fit to get together, and the major part of the distribution of milk is now owned or controlled by one or two large combines, and I have in mind one national combine that is distributing milk in practically every market, every worth while market east of the Rocky Mountains. That condition brings us face to face with another condition, and the question is, "How are we going to meet that condition, when we are forced as an individual, local cooperative organization to meet national distribution?"

The Federal Farm Board has advised that cooperative organizations should get together and form large regional organizations. This is the first time that I have attempted to make this statement, and I am going to make it here and now, that with these conditions that have been facing us for the past two years, the directors of the

two organizations, namely, the Maryland State Dairymens Association, and the Maryland-Virginia Milk Producers Association, have seen fit to enter into and form what is known as the Eastern States Milk Marketing Association. That organization is a super-organization that has control of the marketing of the milk of the two local organizations.

It does not interfere with the management or the membership contract or the financial set-up of a member organization.

Now, if we are to have mass distribution, we must have mass production and mass marketing. We cannot hope to stand alone in our individual markets when those markets are controlled by a national set-up. That is the condition that we found ourselves in. What brought about the formation of the Eastern States Milk Marketing Association was this condition.

I want to make this statement here, so that you members of the Maryland State Dairymens Association, and the members of the Maryland-Virginia Milk Producers Association may know that your membership with your local organization is just the same as it has always been, and we hope that your friendly relationship shall remain and even grow stronger. So much for marketing, or the set-up for marketing.

Now we have come to the point where we have a problem that means probably more in the maintaining of a satisfactory market than any other one thing, and that is that we are today faced with the greatest production of dairy products in the history of the United States. It may not be generally known, but there are today over 50,000,000 pounds more butter in cold storage than there were a year ago, that the price of 92 score New York butter is approximately 17 cents a pound lower than it was a year ago.

Most of us at least know that butter is the only real foundation for milk prices. That isn't only true with butter, but I am told that cold storage plants are packed up with frozen cream. It is also true that cream is being

shipped into our eastern markets today at around $14.00 and $15.00 a can for 40 per cent cream, which means 14 or 15 cents a gallon for 4 per cent milk produced in Wisconsin, Minnesota, Iowa, or some other western state.

If you get that, you will realize that the farmer didn't get much for his milk out there. If you take 15 cents a gallon for milk out there that the farmer produced, that the dealer sold and delivered in this market, and take the expense out of that, freight, handling, etc., trace it back to the farm, then I ask you, what did the farmer get for his milk?

The western farmer is demanding that he must come into the eastern market. He says, "We have the product, we can produce it cheaper, you have got the market, and we have got to come in." We tell the western farmer that he can come into the eastern market and supply that amount of cream which we do not have, but certainly, we are not going to ship any cream out west, and certainly, he can sell only that amount which we do not have. The only thing we would ask of him would be to sell it at a price that would mean a profit to him and would leave us a profit for the amount we sell. Of course, he doesn't see it that way, because he knows that his competitor out there will sell for the low dollar; therefore, in order for him to get the business he goes down, and down, and down, and any price for cream that is a little bit better than butter, or equal to butter where he can get his money out is better than putting butter in cold storage and standing the loss and expense.

Consequently, that is the thing that we are facing today in the eastern markets, and that leads us up to the subject of my remarks this morning, viz., the influence of quality of milk in stabilizing the market. I am sure that you men can realize that if milk was of the same quality all over the world, it would be more or less of the same price. I am sorry, but I don't believe that the men are in this audience whom I would like to have here this morning. I like to have you fellows, but a lot more too, that are not here, because I assume that you men in a very large meas-

ure attend these meetings and keep well posted on market conditions, but the fellow who doesn't attend these meetings doesn't understand or does not want to understand why the Maryland State Dairymens Association should have some very definite marketing policy, and why the Health Department should go out to his place and tell him that he has to do certain things.

It is almost surpising in this day and age after twelve years of cooperative marketing in this market, after twelve years of Health Department regulations, to have men continue writing in and telling us, "If you don't put the damn Health Department out of business, I am going to quit shipping milk." Now, just think of it—a man who owns cows today that thinks that because he is going to stop shipping milk he is going to do something wonderful in this country!

There isn't anybody going to shed any tears because you stop shipping milk, or because you don't ship milk, because there is a whale of a lot of it lying outside just begging to get in, and besides that, we are putting over 8,000,000 gallons of milk in cream. So we are a long ways off from having a shortage of good milk. I am saying this not in an unkindly way, but it does somewhat discourage you after all these years of trying to educate and trying to get our producers to see the thing in a business-like way.

What is holding the price of milk today in the eastern market? Show me the market that is protected by the Health Department regulations, and I will show you a stable market. I am not here preaching the Health Department's job. That is theirs. But I do say that we consider very, very seriously, and we sit down and spend days going over their regulations before we jump on them, and try to put them out of business, because after all, if they are an evil, they are a very necessary one, and after all, I believe they are one of our really worth while friends.

We have today Health Department men in the field who are going around and telling our farmers that they have

to make some necessary improvement before March 1st. Many of our farmers are reared up on their heels and swearing vengeance against the Health Department, and some few against the Maryland State Dairymens Association for allowing the Health Department to put such things into action. Now, my opinion of the Health Department is this—that first it does not cost more to produce high quality milk than low quality milk. The cow won't eat any more food to produce a gallon of high quality milk than a gallon of low quality milk. It doesn't take any longer to milk her. You may have to have some additional equipment, but that equipment does not eat, and it is mostly long lived; it doesn't wear out so fast. So after you are once properly set up, you are ready to go, and you are ready to meet the Health Department requirements, and in meeting the Health Department requirements, you have stabilized and protected your market.

I don't believe there are any two markets in the United States that have better health requirement protection than Baltimore and Washington. Probably we get the same kicks in both markets. But nevetherless, it is true that it is paying us, and it will pay us to meet those regulations.

A man called me this morning and told me he had heard that the requirements in Baltimore were going to go on a 250,000 bacteria basis. I said that that was perfectly possible, "Well," he said to me, "Isn't that a little stringent?"

I said, yes, that it may be, but it isn't half so stringent as to look over your shoulder and see over 50,000,000 pounds of butter stored up, and millions of gallons of cream that is liable to break loose at any time and sweep us off our feet.

The year before last we averaged in the Baltimore market 360,000 bacteria in milk delivered F. O. B. city. We were so proud of that, that we felt encouraged to take another step and have recommended to the Health Department, and you can blame me for it if you want to,

I am not going to shun any responsibility, but I believe the time will come when it is our duty to step forward. We are selling today in Baltimore the same bottle of standard milk that is being sold here, has been sold here for years and years, standard pasteurized milk. If you were to go into Cleveland, you would find standard, pasteurized milk; if you went into Pittsburgh, or Cincinnati, or any other town you would find standard, pasteurized milk. We don't know how many bacteria there are in that bottle of milk, we don't know what the quality of milk is, but it has a label the same as ours, and the average person would assume it was the same quality of milk. Yet, I venture to say that not any of those markets produce a milk with an average bacteria of 360,000.

Any of you who know about bacteria will not be scared to know that if you average 360,000 without special requirements, that you can step up a little bit and make it 250,000, because bacteria are very curious things. You might have 20,000 today and 100,000 tomorrow, and you won't know why. You didn't handle it any differently. That is the thing that happens, and you don't know anything about why it happens, it just goes on.

I might say that this past year our bacteria count ran away with us, and that is what brought about this change in health requirements. The reason is, we think, because we had two very extraordinary seasons. The year before last we had a very wet season. When the springs were running and there was plenty of water and we had cool weather it helped keep the bacteria down. This past season we had an extraordinarily dry season with failure of springs, many of them, and high temperature water, with excessive heat, and the farmers with that kind of facilities could do no better than to put the milk in those springs and let it stay there, and therefore, the bacteria count went up accordingly. Consequently, we got a higher bacteria average this year, considerably higher than we did the year before last.

But that is not discouraging when you know where the trouble is.

The Health Department made a survey to find out—they had been mostly making their rounds in the winter time, and in spring temperature, many farms were classed as having good springs, but when they went around in summer they found they didn't have good springs, and many of them didn't have any at all. These were the springs which usually flow in winter time and go dry in summer, or they are surface springs which dry when the temperature goes up very high in summer time. So in their requirements now they have insulated boxes and using ice and coolers, and undoubtedly that is going to bring about a very much higher quality of milk than we have had in the past.

Now, our thought, men, is this—the day may come, it may not be very far away, if we proceed along the same lines that we are at this time, that we will find ourselves some morning with one of these nice little national set-ups, whose principal desire must be to bring in cheap milk and market it in our market. I do not believe that new people can come into this market and set up a business and go out and steal trade. I know they cannot do it any other way than with a cut price. If a man has got to pay 33 cents for his milk, he has pretty nearly got to sell it at prevailing prices. That won't get him trade. Therefore, he has got to sell below the prevailing price to get trade.

To stand that very long, he has got to buy it below the prevailing price in order to do it. Consequently, the thing that he is going to need in this market first is cheaper milk in order that he can set up and sell it cheaper. Now, what we must do to protect our market against milk coming in from other market territories at a lower price is to maintain a standard of quality higher than such other markets demand. After we have set up this standard of high quality milk, we should have recognition, the public should know about it, and it is my opinion that this milk in Baltimore should be labled, not as standard, pasteurized milk but as special, pasteurized milk or some other name that would indicate to the public

that it is not the same quality milk they were consuming five or ten years ago.

I don't mean to say that the name is going to have everything to do with the changing of the product, but it certainly is going to have a lot to do with it, because the name first designates the difference between a bottle of standard milk and a bottle of special milk or selected milk. And then again, does it not give we farmers an incentive to go far? Haven't we raised our goal? Aren't we more interested to produce that kind of milk? I believe that because of some experience or evidence I have seen in my own county. I know farmers that are hauling milk to a Grade A plant, that are hauling from three to four miles longer distance than they could go to a nearer plant. They have got to meet Grade A conditions. They don't get any premium; they could get just as much for the milk in half the distance. And yet, they prefer to produce Grade A milk and deliver to a Grade A plant without a premium.

What must be the answer? There is only one to my mind, and that is that that farmer has a pride in the production of that quality of milk, and consequently, is willing to do and to go through that extra inconvenience or cost in order to carry out that idea of his.

Now, I believe that our members are going to have more interest in their business and in the production of a high quality of milk if they have a higher goal set for them. That has been true in our county, and I feel sure will be true in the whole Baltimore market. I am convinced in my own mind that the time has come that if we want to stay where we are, we have got to go forward, and quality is the only safeguard that I know of. I am going to say here and now that no man has a right to harbor in his mind any notion that there is any possible prospect of an increased price of milk in the Baltimore market, and I will go further and say in the Washington market, and in my judgment, the assurance of the present price continued will be wholly in the quality of the milk that we are willing to produce for this market, safe-

guarded by more stringent health regulations. If I am wrong, I am wrong. But that is my judgment, and I am giving it to you for what it is worth. I haven't any objection to your disagreeing with me.

I think I would just like to stop right here and now and have this round table talk, because somebody in this audience may be disagreeing with me right along, and if they are, I would like to have their viewpoint. Certainly, men, we have got to look after our own business, and we are living today in a rather different age from what we were a very few years ago.

I might just go a little bit further and present somewhat of a picture that I have in mind, and that is that we find in other business a continuous combination going on. We have it in our banks. A few years ago we had many banks. Every day, almost, there is a consolidation of banks going on. Every day there is consolidations of every other business going on outside of the farmers business. And we, as individuals are being forced to meet not only individual efforts on the part of the middleman and the buyer, but we are forced to meet the efforts and the combined interest and brains of all those men in that industry.

How are we going to meet it? You can't do it as an individual, I don't believe you can do it as an individual organization, but I predict this, that if cooperative milk marketing is to continue to succeed we are going to find ourselves linked up in regional cooperative organizations. My statement is that we are going to find that from Boston to Richmond some of these days (I may not see it) you are going to see one marketing organization. It has got to come, men. I am not going to go into this, but you have read all about this Cleveland affair, because it has been discussed in the newspapers. We have today in the State of Ohio five cooperative milk marketing organizations. That just puts me in mind of five little sticks, and you can take them apart and snap them like that. But if you tie them together in a bundle, you

couldn't break them, and there certainly isn't room in Ohio for more than one marketing organization.

My guess is that we will have at least two or three regional organizations east of the Rocky Mountains, and that those regional organizations will be working so close together that each organization will know what the other organization is doing and thinking about. My guess is that we will have from Boston to Richmond and still further south as the market develops, probably Pittsburgh, will all be in an eastern organization, and we will have Ohio, Indiana, Illinois as the east central organization, and have Minnesota, Wisconsin, Iowa, Kansas, and Missouri in another region, and then the Pacific Coast in another. That may be one too many organizations, but I don't want to see these regional organizations get too big and too far separated, because you want them just as compact and just as near representing the conditions that exist in those territories as possible.

There isn't a lot of difference in the production and marketing of milk down the Atlantic Coast. When you step out into Ohio you find a different condition. When you step still further west, you find another, and so on. By bringing those into regional associations, you are meeting in a large measure the condition in which you find milk production and milk marketing. I am just thinking out loud, but the point I want to make is that we cannot hope to remain as an individual unit while every other business is combining all about us. I wouldn't be surprised some day, and in fact, I am not so sure that it isn't one of our faults, that we are today trying to maintain agriculture on small individual units; I don't know if we couldn't have combinations. I don't know that if a great group of farms couldn't be combined together and put under one management with one real brainy management, with a business management and properly set up, would make far more money than we as individuals are making. Why? Because it doesn't make any difference whether you have got ten acres of wheat or five hundred, you have got to have the same machinery to market, and you use

it one day of the year and leave it idle the rest of the time. If you had enough combination there to have the labor saving machinery that would actually be worth while under proper management where you could buy in bulk or sell in bulk, I have just got a fool notion you will have more money return per acre.

PRESIDENT SNADER: We ought to do that anyway, buy in bulk and sell in bulk.

SECRETARY HEAPS: Yes, that is true. But what we have got today is the small farmer who does not think he is entering into this picture at all, but he is producing enough of that product to destroy the market of the other fellow. That comes right back to the milk fellow. We hear it said on every hand that we are trying to put the little man out of business. We are not doing anything of the kind, and I will go further and say that the Maryland State Dairymens Association has been the only salvation for the little man. He wouldn't be marketing milk today if it wasn't for the organization. We render more service to the little man than we do to the big man, because that little man has been going on all these years without proper equipment. The big man says it pays him to do it, and he goes ahead and does it. We don't want to put the little man out, we want to help him. But we don't believe it is fair for the little man to put the big man out of business. So when it is all boiled down to a dollar and cents basis, we believe that quality is the only thing that is going to maintain our market.

I would like to have a little friendly round table talk on this thing. I would like to have a lot of you fellows' viewpoints, because no matter what we think, some times we get a lot of good thoughts from the other fellow.

Well, it seems like a pretty satisfied kind of crowd. Can't we get one kick?

I didn't go into the butter fat tests, but I thought that was rather a back subject. I don't know that it is worth while to take up a lot of time on that. You people know about all I know about it. This is not our annual meeting, men, this is a dairymens meeting where you have

a perfect right to take up some time in the discussions of the problems that pertain to the production and marketing of our product.

MR. DAY: I am getting along first rate with the association, but in my neighborhood there is no one that comes to these meetings. You can go to the store or station where they deliver the milk and hear ten to twenty tell what they are going to do to satisfy the Health Department or the Association, and what they are not going to do, and that they will quit and ship to Washington. That is the argument. They don't come to these meetings and hear the real thing. One man will start something, and then it will go down the line.

SECRETARY HEAPS: We had a little experience this fall, early in the fall from the western part of our territory where quite a number of shippers were required to do certain things by the Health Department, and they said, "We won't do it, we can sell our milk elsewhere and get more money."

Whenever a man talks about selling his milk and getting more money than he does in Baltimore and Washington, I have some argument along that line. I have to be shown. This offer they were talking about happened to be from a buyer who was buying milk to be manufactured. He jumped in there during October and offered a pretty fair price for milk, because he shipped his milk on where they were short. He disrupted our shippers very much, and we got communications from a number of them saying they were going to stop on a certain date, that they could sell their milk for more and not have to meet any Health Department requirements, any butter fat requirements, and there was no surplus, and everything was lovely. I wrote them back and told them we were awfully sorry that they were going to do that, that we felt sure that they were making a mistake, and to consider it seriously before taking action. Quite a number of those shippers just recently have written in and said they changed their minds.

Of course, they changed their minds, and we know why —because this fellow dropped his price.

PRESIDENT SNADER: I have a letter from one who has only been off the market a month, and he got paid $2.40 for his December milk, and he wants to come back.

SECRETARY HEAPS: Some of them didn't get off at all, because the price went down before they got started.

Now, if the farmer would get that foolish notion out of his head that he can put up that kind of a story like that and make a market—why, if that were possible we would have a glorious good time, because we would be scaring somebody all the time and we wouldn't get very far. But there are a lot of farmers today who think they get along with trying to scare somebody. They write in and say, "If you don't give me more basic milk, I am going to quit." Now, if he would say, "If you don't make the people consume more I am going to quit," it would be a more sensible thing. If I only knew some way to make people consume it, he wouldn't have to write in. I don't think I need to go into the details of that with this audience, because I think every man here realizes that you can't sell more of any product than the public is willing to buy, and a dealer isn't going to buy any more than he can sell, so that is all there is to that.

MR. MCGILL: I want to give a concrete illustration of a point which you brought out a while ago, that the price of butter is mighty apt to affect our markets here. We don't think so because we are not a butter producing center, strictly speaking, but yesterday morning a man from Virginia came into my office and said, "I am a member of your Association. I joined it a year ago, and I have built a new barn, a new dairy house, and all those things. I have been producing sour cream, and while I believe my outfit will meet all of your Health Department requirements, I just was satisfied going along as I was. But you know, the price of butter has gone down, down, down, and I can't stand it any longer. I want to get a permit."

That was the first one that came right in and pointed out the fact that the butter market had forced him into

the milk market. They are coming into Philadelphia now and causing trouble there, but here in Washington and Baltimore we are protected by our Health Departments, so they can't come in from the west, but we have got a lot of people in our own territory who are not producing milk, but cream and because of the low prices they want to produce milk.

SECRETARY HEAPS: Let's make this a round table discussion.

MR. PIERCE: Mr. Heaps, how much milk would a man have to produce to keep milk bacteria down so it would justify him to do that so he will have the information two or three times a month?

SECRETARY HEAPS: What would the bacteria count be? We tried that a few years ago, but that is practically impossible. It would be a tremendous expense.

MR. PIERCE: No, I mean the individual man to pay his own expenses.

SECRETARY HEAPS: I think the dairy laboratories charge something like a dollar a sample. That can be done. A man can get his indivdual samples of bacteria run for 75 cents a sample if he has three a month. The greatest need we have to keep bacteria down is temperature, and that has been pretty well threshed out. That does not necessarily mean that milk of a 65 degrees temperature has a high bacteria count, but it is a mighty close lead. If it is 65 or 70 degrees it has had the opportunity at least to have a high bacteria count.

MR. TURPIN: If the Board of Health requirements were raised any more, in your judgment, if they were raised 10 per cent more than they are now, how much more would it increase the consumption of milk in Baltimore?

SECRETARY HEAPS: Your question is, if the Health Department requirements were 10 per cent more than they are now—

MR. PIERCE: I will make it a different way. If the Board of Health requirements were more hard to meet—

SECRETARY HEAPS: Do I understand you mean if the Health Department requirements produced a higher quality of milk, would that increase the consumption of milk? That is one of the things in the background. We have a dairy council that we are contributing to on a fifty-fifty basis, 50 per cent paid by the dealers and 50 per cent paid by the producers. The dairy council has gone along in their work in the schools and the different organizations in the city, and they have increased the consumption of milk. Three years ago I think we had an 8 per cent increase, but last year, or maybe two years ago it dropped back a little, and this past year I think we gained some. I haven't got the full calendar year figures as yet. But it is our belief, and the Health Department has promished that if we go on and carry out this project that we have in mind, that they are all ready to come out with the greatest campaign for increased consumption of milk that they have ever attempted. In fact, I don't know if they have ever attempted it before, but they are willing to take the lead in coming out for a campaign for increased consumption of milk.

Now, if we start such a movement backed by the Health Department, we are going to get a lot further than we are if we go out and say to the consumer, "We want you to consume more milk, just because we want to produce more milk." They don't do it that way. But if the Health Department says and gives the reasons why they should consume it and assures them of the quality of the product, then I think we ought to get favorable action and the increased consumption wouldn't have to be very great to more than pay us for all the cost it would cause us in meeting these additional requirements. That is your thought, as I get it.

MR. PIERCE: Yes, but I don't get the direct answer to my way of thinking—how much would it increase it? Suppose they get the score higher, how much would it increase? That is the easiest thing for us to do.

SECRETARY HEAPS: I presume you are from the Washington market?

MR. PIERCE: Yes.

SECRETARY HEAPS: They work along a little different line than we do. We set great store by your score—in other words, your milk price is based on a score. We have never believed in Baltimore that that really meant a lot towards the quality of milk. It is very nice to go on a dairy farm and find a nicely equipped set-up, but we believe that low grade milk can be produced just as easily in a $10,000. barn as in a $4,000. barn, in fact, we have had that experience; without mentioning any names, I have in mind one particular producer in the Baltimore market who had the best dairy barn that I know of, I don't know of any better, and that man had continuous trouble with bacteria, and finally went out of business. Of course, he wasn't tending to the milk himself, but he had employed the best help he could. Therefore, we do not believe that costly equipment means necessarily high quality milk. Our Health Department does not work that way.

We do demand the essentials to the production of high quality milk, the necessities, namely, clean stables, clean cows, clean utensils, whole milk. Clean, clean, clean, is about the answer to high quality milk. If you have got clean cold milk, I am not afraid to drink the milk.

MR. PIERCE: I am not getting an answer to my question. I will talk along bacteria lines first. I started in on barn scores, which doesn't go into the Baltimore market. On the bacteria count, we started in with around 300,000, and now we have reduced our bacteria, brought it down farther—if I bring it down any farther, will the people drink more of the milk? I want to know if we have reached the limit. If we continue to make better milk, how much more can we sell? That is my question.

SECRETARY HEAPS: Well, that will depend, as I say, very largely on how the Health Department will go, because they are the real mouthpiece of the public. Of course, we can say to the public that we have got the finest product here that has ever been produced, but it

needs something more than that. Because we are the interested party. If we can get the Health Department to tell the public that they should drink more of this milk because of its food value and because it is essential to the health and welfare of the public, and then build it up by the quality of the product, it just means so much more than if I or you personally say it. In other words, we have got to have the quality in order to get the Health Department to say that. The Health Department has got to say that before we can get increased consumption. But if we don't get increased consumption, just assume we don't get any increased consumption, I claim it is essential in order to protect our market. In other words, we are building the wall higher and higher around our market, and it is going to be a whole lot harder for that outsider to get in than it is for us who are already in to stay in.

That is the thought uppermost in my mind—why give up what you have got thus far? Let's go all the way. Let's keep this market; it belongs to our people. We pay our taxes here, and we have no right to give it up to the other fellow out west. I am just that selfish, I would fight and go a long ways. I think I have made this statement—I think we could put on a brand new span suit of clothes, or duck, or linen, every morning if the Health Department required every man who produces milk for Baltimore to do it, because I believe we would be paid for it. You just can't help it.

MR. BUSHEY: Do you think it would be practical for a man producing fifty to 100 gallons of milk to put in artificial refrigeration?

SECRETARY HEAPS: I will answer this question in this way. I would have to know if he had a good spring that produced throughout the year at a temperature of 52 or 54. In that case, I think I would say no. But if he has to depend on pumped water, I would undoubtedly say yes every time, because I think that nine-tenths of our trouble from bacteria and high temperature are caused

because our farmers have no facilities to keep their milk cool but pump water.

We have found that good results can be obtained by approximately the following—a properly insulated box, the use of a cooler, the milk run over a cooler, and pump water 52 or 54 degrees, and then that box filled with fresh water, and that milk set in after it has been run over the cooler. We have found that the temperature varies very little. We made some tests on that.

MR. SPARKS: I would like to say in answer to this question, if you are on an electric line, get electric power and put in a cooler, and you will never regret it. You will like it better than going to the spring and back on the ice.

MR. BUSHEY: Well, we had a spring. Last year it dried. We have to go quite a ways from the barn to the spring. We have the electric current.

MR. CARROLL: Mr. McGill a little while ago made a statement that the farmer down in Virginia had been shipping milk for making butter; on account of the reduction in price he was coming into the market with his milk. He also made a statement that there were 50,000,000 pounds of excess butter in storage.

That recalls to my mind that I read a Government bulletin which stated that there was a decrease in consumption of butter last year of over 30,000,000 pounds and an increase in the consumption of oleo of the same amount of pounds. You would be surprised if you go through the country to see how many farmers are eating oleo.

SECRETARY HEAPS: I am glad you brought that up. I had that in mind. This is a very intelligent crowd, and I wouldn't like to question them or insinuate that this crowd would eat oleo. Yet, I would be afraid to ask all of those who eat oleo to hold up their hands. Men, that is true.

At the National Dairy Council meeting in Chicago on the 9th of December somebody had figured out that we could eat up this 50,000,000 pounds if every man, woman,

and child in the United States would eat two little pats of butter more in one month. So if everybody would eat two of those pats a month we wouldn't have any cold storage butter. That is very nice, but the question is, how are you going to get those people to eat those two little pats?

No, men, right here in our territory, probably facing me in this audience are men who down in their hearts are criticizing the organization, who are not marketing their milk, or not getting more for their milk, who are going to the store every Saturday night and buying oleo. I am sorry to say it, but it is a fact.

I had a talk the other morning on the train with the secretary of one of our good Senators from Harford County, and I said, "By the way, I wish you would tell the Good Senator I am very much interested in a bill before Congress in reference to foreign oils and fats that are coming into this market that are now on the free list and are being used in the manufacture of oleo and butter substitutes.

He said, "Well, I am not in sympathy with that."

"Why?"

He said, "Well, it is good stuff. I eat it."

"Yes," I said, "but it hasn't got the food value of good butter."

He said, "I can't help that. It goes pretty good on my bread. I am opposed to that."

I said, "You tell that good Senator there are a lot of dairymen in Maryland that think a lot of him, and they may think more of him today than he ought to think of oleo. Tell him to consider."

That is where I stopped. I remember a few years ago I went down to Annapolis on a fight on oleo, and it is surprising to know that Representatives, farmers in the Legislature stood out and fought that oleo bill and said they weren't going to be a party to take the poor man's butter away from him.

That is what we are doing today. This gentleman here struck the nail on the head. There wouldn't be any surplus of butter if we didn't have oleo. But it is a little like bootleg liquor.

Folks, I think I have taken enough time.

MR. BROOKS: I would like to ask one question. What effect did the depreciation of the Stock Market have on the consumption of dairy products?

SECRETARY HEAPS: We haven't our December report. It hasn't shown up, unless it does show up in December. We always have that holiday slump. Everybody spends all their money for the holidays, and they cut down the consumption of milk, about the 15th of January when they get a pay check or two they start again. I really couldn't answer that intelligently until after the first of February when we get the December and January reports and see whether or not our consumption fell below last year.

MR. SEPP: In regard to the rating of the Health Department as to the barns—about how does that average on the whole?

SECRETARY HEAPS: I really don't know; I have no information.

MR. SEPP: Another question, a question about the amount of butter that is piled up. The price has dropped eleven cents, you say. I noticed that to the consumer it hasnt' dropped.

SECRETARY HEAPS: I asked that question the other day of the dealer. But that is the same old story. The price of wheat goes down, but the loaf of bread does not. No, you pay the same for butter.

MR. BAILEY: I would like to ask, what is the rate of percentage increase of fluid milk coming into Baltimore for the past year over the year previously?

SECRETARY HEAPS: I don't have the exact figures on that yet. Our fiscal year ends on the 31st of July. Up to

the 31st of July last we had handled the greatest production of milk that Baltimore had ever seen. I think that our fall production this year is running just about even with last fall. We did not increase this year in the fall over the previous year. Then that raises the question in our mind, whether we have reached our maximum production, whether we desire to go forward or not, and that enters into a possible question which might be a serious question as to whether or not we are going to furnish this market with milk for cream purposes, for ice cream. I had hoped that we might go on increasing our production of Class 2 milk, and certainly, no man has lost money in the Baltimore market by producing surplus milk. They will tell you so, but they haven't convinced me by a long shot, and I am making this statement today, and I have made it over and over again, that the price Baltimore has paid for the surplus milk has paid the farmer better than any other thing he grew on his farm. I will go farther, and say that there is more profit in the last ten gallons of milk than in the first ten. So if you have anywhere around a reasonable amount of basic milk, I don't see that you ought to worry if you double your production. We have got a market for it which will take care of it, and you are just increasing the output of your farm and your income that much more, and aside from that, you are taking care of a demand in Baltimore that may sooner or later get away from us because of the fact that we are not supplying a sufficient quantity to maintain the regulations on cream prices for cream purposes.

So there ought not to be a slowing up of the production of Class 2 milk, at least, I know of no reason why there should be. But there certainly is no reason why a farmer should demand a higher basic average, because he has surplus milk, because the consumption is not increased, and we will do well to stay put. Taking the whole dairy industry into account, our greatest concern is to stay where we are and hold what we have got, and we can do that in my judgment best and probably only by increasing the quality of our product. I thank you.

CHAIRMAN SNADER: Our next speaker on the program is Mr. J. B. Abbott, Agronomist, of the National Fertilizer Association, who will talk on "Improvement of Pasture." Mr. Abbott.

. . . Mr. Abbott presented his prepared Paper . . .

(The paper presented by Mr. Abbott is printed in the report of The Maryland Crop Improvement Association.)

REPORT

of the

Twenty-first Annual Meeting of the Maryland State Beekeepers' Association

BALTIMORE, MARYLAND

January 8, 1930

The annual meeting of the Beekeepers' Association was well attended. The meeting was held at the Hotel Lord Baltimore. Following a brief address by the President, the Secretary-Treasurer presented the financial report, a copy of which is appended. The following program was carried out:

Sugar—B. B. Jones, Carrollton, Maryland.

Races of the Honey Bee—W. J. Nolan, Apiculturist, U. S. D. A.

Eastern Shore Beekeeping—A. Howard Johnson, Centerville, (Withdrawn from Publication).

Flowering Plants, Shrubs, and Trees for the Beekeeper—Ernest N. Cory, College Park.

Honey as a Disseminator of American Foulbrood Spores—George J. Abrams, College Park.

Disease Control in the United State—C. E. Burnside, Apiculturist, U. S. D. A. (Withdrawn from Publication).

Mr. Nolan discussed the relation of the forthcoming Census to the beekeeping industry and read a release prepared by Mr. Hambleton urging the cooperation of all beekeepers.

Subsequent to Mr. Burnside's address, there was considerable discussion and Mr. Herbert D. Smith of Takoma Park, Maryland, who has been a State Inspector in Michigan, and who has worked in commercial apiaries in Michigan, delivered a brief address outlining the plan of operation followed successfully by one of the Michigan beekeepers. In effect this is the use of a quarantine yard

to which all colonies that are diseased are transferred after treatment. This gave very excellent results.

Mr. Jones' talk was accompanied by demonstrations of the effect of the various materials that he was working with on iodine in order to show the presence or absence of starch. These demonstrations were correlated with the contention that certain materials usually designated as sugars were not strictly speaking sugars in the true sense.

The following officers were elected at the March meeting:

A. Howard Johnson	President
William F. Aman	Vice-President
Ernest N. Cory	Secretary-Treasurer
J. R. Abercrombie	Director
George J. Abrams	Delegate to Farm Bureau Federation.

Ladies and Gentlemen:

It seems that Mr. Cory did not profit by last year's experience, for he put me on the program for a talk again at this meeting. I haven't much to say, but there are, however, a few things.

I am certainly glad for the interest which has been shown in the Association this past year. The people from the Eastern Shore have been coming to the fore considerably. I think our friend Mr. Johnson must be largely responsible for this activity. They are certainly showing us that they can produce good honey down there too. We are certainly glad to have them join with us and possibly we can be of help to them and they to us.

I want to say that I think we are very fortunate in being located so near to our State and Government headquarters and they are so kind and generous with their assistance. I think we have a decided advantage over other beekeepers associations in that respect and should appreciate it.

I feel that the beekeepers' exhibits at the Timonium Fair this year showed a marked improvement over last

year, and that the exhibit is very educational to the beekeeper as well as to those who are not. It is well worth our time to study the exhibits carefully for we will always pick up some pointers on selecting, grading, packing, and displaying our products.

There is one thing I want to mention which I think it would be well for us to take into consideration this year, the matter of cooperative buying. As I understand it the Association use to cooperate in buying and got a very substantial discount, so it seems to me if we would make an effort to do that again it might be to our advantage. No so long ago I was down at the Rawlings Implement Company, and after ordering a fair size bill of goods I inquired about a discount. After a little consideration they did give me a little discount and then said to me, "What you fellows ought to have is an association to buy through." I answered that we did have an association and that is as far as I got when the man jumped in and said, "Oh, what does that amount to. Nothing. It don't mean a thing." Well after he got through I didn't like to tell him that I was the President for I didn't think it would look so good, so I didn't say anything. Now, I think it would be well if we would get busy, be a real active association that no one could laugh at, and make 1930 as successful as possible for all of us.

LLOYD B. SHEARMAN.

SUGAR

BY B. B. JONES, Carrollton, Md.

Mr. President, Fellow Beekeepers, Ladies and Gentlemen:

I am quite sure that you are all fully acquainted with the fact that your orator is not a practising physician, neither is he a trained chemist. He was taught to read law, graduating into a bushwacker, he went into the hills, among the trees, the blossoms, and the bees to study the Laws of his God.

That he has learned some of those laws is attested in the successes which usually attend his efforts. Just a

few days ago I was told by a lady that she had sent a small portion of honeycomb to a friend who had recently lost the use of her voice. Early the following morning the telephone rang with that friend on the other end able to announce in a most jubilant tone that she had recovered the use of her voice over night.

It may be just as well that I am not a scientist. When my friends learned that I had been assigned a topic for a talk they all desired to aid me and much that was offered to me was intricate and confusing and had I not been deeply grounded in my thesis this talk might have been cancelled. Possibly such an event would have been quite fortunate both for you and for your orator.

I received at least three different formulas detailing the mechanics followed by nature in constructing sugar and much more that would have confused a seasoned operator and I can appreciate most fully the feelings of a certain scientist who directed that I should cease my publications as they were causing the doctors much confusion.

It is my opinion, for which I have some authority, that although the whole fabric of both animal and plant life depends upon the condensation of certain elements to form sugar, the actual mechanics followed in the processes is entirely unknown and it is althogether possible that my guess may be quite as accurate as that of another.

I am sure that I can hardly do much worse than a certain noted investigator did with a related subject when, after publishing the inquiry "What is Dextrose?" and replying "It is not Corn Sugar," stated in a subsequent publication "A very good example of artificial Dextrose is Corn Sugar."

The topic for discussion is "Sugar", but What is Sugar?

It is considerably more than the commodity called by that name usually found upon the breakfast table with which all are quite familiar. That is the product of man's misguided efforts to improve the handiwork of his God and instead deals out sickness, suffering, and premature death to those who indulge in its use.

The Great Creator in his infinite wisdom has presented to man, to be shared with his other creatures, many substances which for convenience have been called "Sugar."

Many of these substances differ greatly from others, while some of them so closely resemble others that man is not able to differentiate between them. Two substances belonging to the latter class are Dextrose, which is one of the components of Cane Sugar, and the Syrup which has been rendered from Starch, together with the crystal formations which are commonly called Corn Syrup and Corn Sugar, but which for special reason have been named Dextrose by their sponsors.

It is my desire to discuss these substances, but the chemist has informed me that he is not able to supply me with Dextrose, which has been taken from sugar. It will then be well to consider the substance which must be used as its substitute in a comparison with the so-called Dextrose which has been rendered from Starch.

How is Sugar Created? Carbon, Hydrogen, and Oxygen, with other elements, are gathered by the plants, through their roots, from the moisture in the ground. They are carried in the saps in a soluble condition as Carbon hydroxide to the leaves of the plant, where in the presence of and with the aid of Chlorophyll, one of the Plant pigments, possibly with the aid of certain enzymes, and with the addition of Carbon dioxide, which is gathered by the plant from the air, through its leaves, they are compounded into those substances which are called "Sugar."

In this changed form they are known as Carbohydrates and are returned to the plant still in a soluble condition to perform various functions. Some of it, rendered insoluble, is converted into Cellulose and stored as a part of the plant's woody structure; some of it is converted into Starch, also insoluble, and stored by the plant in various ways according to the nature of the plant, in beans, in potatoes, in various cereal grains, such as wheat, corn, rye, rice, barley, etc.; while some of it is stored in

the fruit of the plant or remains in its juices as Sugar, still in a soluble condition.

Why some of these elements are converted into Starch and others into Cellulose, while still others remain in a soluble condition as Sugar in the juices of the plant or are stored in its fruit, constitutes one of those mysterious yet miraculous paradoxes which nature has not yet revealed to man.

The first condensation of the elements by Nature results in Formaldehyde having a formula of CH_2O, but formaldehyde is quite poisonous to all life both in the floral and in the animal kingdoms. When, however, she is not interfered with, Nature will mother and protect all of her creatures from harm. In this instance, she performs another remarkable paradox, by condensing six units or molecules of the poisonous formaldehyde into one unit or molecule of "Sugar", an indispensible food with a formula of $C_6H_{12}O_6$, just six times that of formaldehyde and a food without which no life can exist.

In its turn sugar is condensed into the more complex substances, such as Starch, Cellulose, etc., with formulas $(CH_2O)n$.

In the list of sugars which are condensed from Carbon, Hydrogen, and Oxygen may be found the proverbial "57 varieties" whose principal difference being the number of atoms contained in the molecule. We thus have Dioses, those which have two carbon atoms in each molecule; Trioses, those which have three; Tetroses, four; Pentoses, Hexoses, Septoses, Octoses, and Nonoses.

Man has learned to use only the Hexose Sugars, those which have six atoms of Carbon in each molecule together with the proper number of atoms of Oxygen and Hydrogen. They include Dextrose, Levulose, Galactose, Mannose, and the compounds of these which include Cane Sugar or Sucrose, Beet Sugar, Maple Sugar, Sorghum, Milk Sugar or Lactose, and Honey.

I sometimes fear that in his zeal to count the atoms correctly, the investigator overlooks or disregards other properties which are equally as important.

Cane Sugar is classified as Sucrose. It is a compound of Dextrose and Levulose. It is produced by evaporating at low temperatures the juices which have been expressed from the Sugar Corn and the Sugar Beet. The crystals are isolated with a centrifuge, leaving the molasses. Two substances are thus produced and, were they similar, either all or none of it would crystallize.

The crystals thus produced are again reduced to an aqueous solution which is forced through some filtering medium, generally bone-black, removing coloring pigments, flavoring and other material including many valuable elements which are quite beneficial to man and which he cannot afford to lose. The crystals are again isolated, leaving a syrup called Refiners' Syrup, thus producing two more substances which are not similar.

Another substance, Rock Candy, is produced in a chemical treatment of simple syrup during which crystals form upon strings which are suspended in the syrup leaving a syrup, which will not crystallize, which is called Rock Candy Syrup, evidently two additional substances which are not similar and your orator can present expert testimony that, as a remedy for coughs and colds, Rock Candy Syrup possesses properties not equalled in either of the other five substances or in any other substance except Honey, yet the Bureau of Chemistry, U. S. D. A., declares all are Cane Sugar and all are similar.

It is well known that when honey turns to crystals, which it often does, it is the Dextrose portion which forms the crystals, leaving the Levulose in a liquid form. It is also known that Dextrose will crystallize most easily, whereas Levulose crystallizes only with much difficulty, if indeed at all; therefore, if it is Dextrose which Nature crystallizes out of a solution in one instance, it is fair to assume that it is Dextrose which Nature will crystallize out of a similar solution in another instance. Considering the fact that Rock Candy Syrup possesses many properties, including those of a corrective nature, which resemble those belonging to Levulose rather than those belonging to Dextrose, I shall, for the purposes of this talk,

assume that the crystals of Rock Candy are Dextrose and after a condensed consideration of the nature of Corn Syrup and Corn Sugar, submit for your inspection a few chemical demonstrations, one of which will compare Corn Syrup with Rock Candy, which if not Dextrose is as close to Dextrose as any substance which I am able to obtain.

Corn Syrup is manufactured or rendered artifically from Starch and financial considerations demand that corn shall be used for the purpose, although Starch derived from any source will produce similar results. The starch is boiled and a weak dilution of hydrochloric or other strong acid is added, thus rendering it into a syrup.

It has been shown that starch is the product of the condensation of many molecules of formaldehyde and if it be examined it will be found to be made up of clusters of molecules with each cluster containing one hundred or more.

During the processes of hydrolysis, or rendering it into a syrup, the large clusters are broken down or divided into smaller clusters. Some of the mixture will then be in clusters each containing 18 or 20 molecules. This is Dextrine and is the sticky gum used on the backs of postage stamps. Some of the mixture will be in clusters each containing two molecules. This is called Maltose, because of its similarity to the structure of the sugar found in grain, particularly when the grain is germinating and quite possibly it is a natural sugar. The remainder of the mixture will be in single molecules with each molecule constructed in a manner similar to the construction of the molecule of Dextrose.

Corn Sugar differs from Dextrose in the fact that it does not crystallize easily. Although the reward for the discovery was great it was manufactured many years before a method was devised that would cause it to throw down crystals.

Such a method was recently developed by a chemist employed in one of the Bureaus of the United States Department of Agriculture, and the story is told that he resigned his position, was immediately employed by one

of the corn products refining companies and today the housewife is unable to determine definitely whether the package which the grocer hands her as her purchase contains Corn or Cane Sugar. It will, however, require a much more complicated method to produce crystallization in Corn Syrup than merely adding a little honey to it which is the claim of certain propagandists.

The newspapers inform us that the production of Corn Sugar has increased from 150,000,000 pounds in 1921 to 960,000,000 pounds in 1929; that the principal use to which it may be put is to convert it into illegal alcohol. We are also told that ten pounds of the sugar will make one gallon of alcohol, but neither Corn Syrup or Corn Sugar can be sold to a consuming public for food unless it be disguised and mixed with other commodities, thereby fraudulently using the good reputation of the other commodities to further the sale.

I have several ounces of Corn Syrup. Its sponsors called it "Dextrose". We will pass it around for a close inspection. Taste it should you feel so inclined, but I am quite sure that you will not find it at all attractive either in its appearance or in its flavor.

I will now place a small sample of this syrup in one of these small dishes and in each of the other two dishes I will place a sample of Rock Candy, which has been dissolved in a little water.

Now add one drop of iodine to the Corn Syrup and one drop to one of the dishes of Rock Candy as a check for comparison. The iodine in the Rock Candy is already lost and it is impossible to distinguish to which dish it was added, whereas the drug in the Corn Syrup has become almost black indicating that although the Syrup may have been reduced to its simple elements it has not been converted into a sugar—It is still starch.

Here is a can of Commercial Syrup, of which there are a number of brands. They are all mixtures of Corn Syrup and Refiners' Syrup, neither of which when alone is commercially possible. Mix them and the consuming

public may be fooled into believing that it is a good molasses, but it is not molasses.

If the crystals which have been crystallized out of Refiners' Syrup be Dextrose and the syrup remaining which will not crystallize be Levulose, then the Commercial Syrups, or the mixtures of Corn and Refiners' Syrup, are the equivalent of Cane Sugar. Cane Sugar is, however, as close to Commercial Syrup as any substance which I can obtain and for use in the following demonstration to compare it with Commercial Syrup it will answer very nicely.

We will then place a small sample of Commercial Syrup in one of these dishes and in another dish place some Cane Sugar which has been dissolved in a little water adding one drop of iodine to the contents of each dish and immediately the iodine in the sugar disappears whereas that in the Corn becomes black.

It has done something more. You will notice that the black is in streaks and splotches and, just as the iodine fused with the Cane Sugar, it has fused with the Refiners' Syrup, which is a sugar and is miscible. It has avoided the Corn Syrup and shows that the Corn Syrup is not miscible with either the iodine or the Refiners' Syrup; therefore, it has not been reduced to its simple elements, and hence cannot be assimilated into the blood stream without additional labor upon it by the digestive organs.

It would not be at all fair to close this discussion without according our little pets, the honeybees, who are our best friends, an opportunity to testify upon the subject, and the evidence of the animals must not be ignored or disdained because of its humble origin. Mother Nature, some times referred to as Instinct, teaches the animal its habits, and placing implicit confidence in her teaching the animal renders strict obedience thereto. It cannot do otherwise, and it cannot be fooled.

Although both the honeybee and the puppy dog are extraordinarily fond of Cane Sugar, neither can be induced to indulge in Corn Syrup, or in Commercial Syrups which contain Corn Syrup in considerable quantities.

Evidently there exists a difference between these commodities which the animals are able to detect and detect most easily and the village wag opines that "man is dumber than the pup" when he is unable to distinguish the difference.

A more nefarious or vicious product has never been offered to a consuming public for food than either Corn Sugar or Corn Syrup. They are vicious because harm will result from their continued use in the diet. It is quite probable that Refined Cane Sugar may equal either of these productions in its harmful effects upon living tissues, but it cannot excel either. They are nefarious because they cannot be sold to a consuming public except in the fraudulent use of the good reputations of other commodities to further the sale.

Dame Nature makes no mistakes, although there are occasions when to the finite mind of man she appears to be extraordinarily lavish with her labors, creating products only to destroy them, but the Good Dame undoubtedly had a good and sufficient reason for creating both sugar and starch. If one would have answered for the other, only one would have been created. The Good Dame not only created both sugar and starch, but she created many classes of sugar and many classes of starch. There is a use for them all.

Dame Nature constructs starch from sugar and I presume that she is fully competent to reverse the process and break the starch compounds down into sugars, but man has not yet learned to convert starch into sugar.

RACES OF THE HONEYBEE

By W. J. Nolan

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In recent years several factors have caused in this country a renewed interest in races of the honeybee. Among these factors may be mentioned a series of papers

published in 1925 by Mr. Baldensperger, in which he described the various races of the honeybee and gave special attention to a new variety which he called the Sharan bee. Shortly after this, came the development of a method for the artificial insemination of queenbees, biometric studies, carried on in Russia, which showed clearly that bees from different localities are marked by special physical characteristics, and the growing need in the United States for bees to serve as pollinating agents for various crops under the wide range of climatic conditions to be found here.

At the time of the World War there was relatively little interest, in this country, in the various races of the honeybee. Most of our authorities on beekeeping were well satisfied with the Italian bee, and recommended it for all-around beekeeping purposes. The Italian bee had been brought to this country at about the beginning of the Civil War, and within a few decades it had supplanted the common black bee, which was introduced by settlers in New England about 1660 and had had no rival until the appearance of the Italian bee. The voyages of Benton and Jones to the Mediterranean countries in the early eighties resulted in importations of numerous other races, but these as well as races imported later, for the most part, were discarded in favor of the Italian. Consequently, practically only Italian bees were offered for sale in this country at the time of the World War.

Shortly after the close of the World War the discovery that the Isle of Wight disease was caused by a mite, *Acarapis woodi*, led to certain restrictions on the importations of queenbees into the United States, and may have served as a further damper for a time on the interest in honeybee races other than the Italian. Since these restrictions were put into effect relatively few importations of queenbees of any race have been made, although during the past year requests to make special importations have been more numerous than at any preceding time.

The genus Apis, to which the honeybee belongs, is divided into four species: *Apis dorsata*, the giant bee of

India; *Apis florea,* the dwarf or rock bee; *Apis indica,* and *Apis mellifica.* Our common honeybee, of course, belongs to *Apis mellifica.* The classification given by v. Buttel-Reepen is followed here.

Apis dorsata is found only in India and near-by islands in the Indian Ocean, and in the Malay Peninsula. It is the largest honeybee known, the workers being as big as the queenbees of the Italian race. The colonies build only single combs, out in the open on the limbs of high trees or under overhanging rocks. These combs, however, at times are over a yard high and a yard wide. Cells face on both sides, as in the case of the Italian bee. There is one report that such a comb contained 60 pounds of honey. The cells of worker and drone are of the same size. The adult drones are slightly smaller than the workers.

Apis florea, the smallest honeybee known, is confined mostly to India. Like its giant relative, it builds only one comb but this comb is not much larger than a man's hand, and is built on low shrubs. The abdomens of the workers have distinct striped markings.

Apis dorsata and *Apis florea* have other traits in common, among them being that of migrating under unfavorable conditions. Thus it is reported that they migrate during the hot, dry season from the plains of India to cooler regions in the hills. *Apis florea* builds special queen cells and special drone cells.

Apis indica is also found in India, and in other parts of Asia as well. In India it is kept in native hives, but the crop is relatively small compared to that obtained from the European bees, and the same may be said of the varieties of *Apis indica* found in China and Japan.

Apis indica is slightly smaller than the European bee. It is further distinguished by having tufts of grayish hair between the eyes as well as tufts or bands of hair on the abdominal segments. The cappings of the drone cells differ distinctly from those of any other race in that they each have a small pore.

Apis indica to a lesser degree than *Apis florea* or *Apis dorsata* tends to desert its hive under unfavorable conditions. The Japanese variety is reported to resist better than the Indian the large hornet which proves so deadly to the honeybee in Asia. When the hornet is waiting near the entrance of the hive, the Japanese bee remains inside instead of rushing out to fight. When the hornet enters the hive, however, it is pounced upon by the inhabitants and is killed.

The species of Apis which is of most interest to American beekeepers is, of course, *Apis mellifica*. *Apis mellifica* is divided into two subspecies, *unicolor* and *mellifica*. *Apis mellifica unicolor* is found in Africa whereas *Apis mellifica mellifica* is found in Europe and neighboring regions in Asia, and on the Mediterranean islands. The African bee *unicolor* is divided, in turn, into three main varieties: *fasciata*, the Egyptian bee; *intermissa*, the black African bee; and *adansoni*, the yellow African bee.

Apis mellifica unicolor adansoni and also *A. m. u. intermissa* are represented from the north to the south of Africa. They are kept by the natives throughout the country and both races are kept in hives by the white settlers in South Africa as well. The bee known as the Punic bee, which received considerable discussion in our bee journals at one time, belongs to the race *intermissa*. This bee, however, did not find favor here, because it did not winter well and was very cross. Several years ago it was reported of *intermissa* in South Africa that the eggs of its laying workers developed into either workers or queens, as the case might be, instead of into drones, as is true of the European bee. This has been confirmed recently by Lundie.

The race *fasciata* has aroused considerable interest in European and American beekeeping literature not only because of its peculiar characteristics but because it was one of the early races imported into Europe. This bee has been described as being marked with blood-red spots, and presenting an appearance of having been sprinkled with flour. In Egypt it is kept in long, cylindrical, mud

hives of small diameter. The honey crop of this native hive averages only a few pounds per year. Under northern conditions it has been found to winter poorly, owing to the fact that instead of clustering on the approach of cold weather, it merely remains where it is regardless of location, whether on the side of the hive or between the combs. Another characteristic which seems to distinguish it from all the other races is the abundance of queen cells which it builds at one time. Their number may reach a couple of hundred or more. These cells are not built singly but are crowded all together somewhat like a bunch of grapes. If the colony is queenless, virgins may emerge from each so there may be a couple of hundred virgins, more or less, in the colony. This condition seems, however, to cause little difficulty, since when one of the virgins mates the others gradually disappear. The Egyptian bee has a further passing interest in that some writers hold that the modern Italian bee has arisen as a cross between the black German bee and the Egyptian bee.

Passing to *Apis mellifica* we come to the races with which American beekeepers are most familiar. First among these may be mentioned the Italian bee, *Apis m. mellifica var. ligustica,* which is found in Italy and Sicily. It is marked by a yellow band on at least the first three abdominal segments. Further than that, it is a fairly gentle bee, guards its hive well, keeps it clean, and gathers honey well. The fact that the Italian bee guards its hive well and keeps it clean renders this race especially valuable in the presence of the waxmoth or of European foulbrood. It is widely held in this country that the Italian bee withstands these two pests better than does any other race of the honeybee.

The common black bee, which was the first race of honeybees introduced into this country, is held by good authorities to be that variety of the German brown bee, *Apis m. mellifica sp.,* known as the heather bee, *Apis m. mellifica var. lehzeni.* This bee in its native haunts is marked by its swarming propensities. Its swarming

activity has been looked upon with favor in this region, by the older beekeepers at least, since the main honeyflow, from heather, occurs late in the year, consequently there is a long season for building up and so the more swarms the more honey. The excess swarms at the end of the honeyflow were either sold or else fell a victim to the method of taking off the honey which consisted in sulphuring the bees. This strain is not as gentle as the Italian. From recent reports it is rather hard to get pure stock from this variety.

The German brown bee is found throughout central Europe and for that matter the bees in France, Spain, and Central Russia may be only varieties of this race. In distinction from the Italian bee it contains no yellow bands on its abdomen but is marked by a narrow band of gray hairs on the posterior part of the abdominal tergites instead. The young bees of this race if viewed in the sunlight at a certain angle may present a slight brownish appearance. This race and more particularly its variety, the Dutch or heather bee, has a tendency to run to the edge of the comb and to drop off in bunches. Certain of its other characteristics will be mentioned when those of the Carniolan race are given.

The Carniolan *Apis m. mellifica var. carnica*, takes its name from the province of Jugoslavia in which it is found. These bees very much resemble the German brown as described, except that their gray bands on the abdomen are wider than in the case of the German brown. These bands cause the abdomens of newly emerged Carniolan bees to present a distinct Zebra-like appearance. Carniolans, as is true of the German brown and the Dutch bee, cap their honey white due to the fact that they leave an air-space between the honey and the cappings. Most reports from this country indicate that these three races are less resistant to European foulbrood than is the Italian bee. They also put up less of a fight against the waxmoth. On the combs of colonies of both Carniolan and German brown stock, the writer has observed, on more than one occasion, a few waxmoth larvae

while he saw none in neighboring Italian colonies of the same strength in the same apiary.

The Caucasian bee *Apis m. mellifica var. remipes,* is now arousing much interest in this country because of its reported long tongue length. This bee comes from the Caucasus of southern Russia and like the Carniolan is marked on the abdomen by gray bands. It is an exceedingly gentle bee but defends its hive well. It has one peculiar property in that it will place a curtain of propolis to reduce the entrance of its hive in unfavorable weather.

The Cyprian bee, *Apis m. mellifica var. cypria,* is found on the Island of Cyprus and resembles the Italian bee as we know it but is somewhat smaller. The first three abdominal segments have copper-colored bands, the remaining segments being distinctly blackish. The Cyprian is an industrious bee but is marked by its proneness to sting when disturbed. The cappings which it puts on cells of honey present a water-soaked appearance, due to the fact that, unlike the Carniolan and some other races, it leaves little if any air space between honey and cappings.

Various writers mention other races, about which there appears to be a conflict of opinion. For instance, in Palestine a "Syrian" and a "Palestine" bee have been described but v. Buttel-Reepen holds only the Syrian to be a distinct race and calls it *Apis m. unicolor var. syriaca.* He holds that the so-called "Palestine bee" is so closely related to the Egyptian as not to form a separate race. Baldensperger on the other hand, holds that the Palestine bee is a distinct race.

It is somewhat difficult to distinguish between certain of the races on the basis of color or other visible physical characteristics. To be able to define adequately the various races one must be familiar with their biological behavior as well as with their physical characteristics. Work on these factors is now under way at the Bee Culture Laboratory but will not be described here except to mention that results obtained thus far indicate that the

Caucasian has the longest tongue, followed by the Cyprian, Italian, Carniolan, and German brown bee, respectively. This is in line with results obtained in other countries.

FLOWERING PLANTS, SHRUBS AND TREES FOR THE BEEKEEPER

BY ERNEST N. CORY, College Park, Maryland

The value of incidental sources of honey and pollen as an aid in the upbuilding of the colony or in carrying it through a general dearth of nectar with unimpaired hive morale is often overlooked. Contributory is the term that has come into use in regard to such nectar and pollen sources, and it describes so aptly the situation that its use should be encouraged. However, the extent to which minor honey plants actually contribute to the welfare of the colony and to the surplus honey may not be fully realized.

After the long winter, who can even guess the extent to which the first chick weed blossom or the earliest willow or red maple contributes to stir the bees from their lethargy and to announce to their senses that spring and another season of activity is on the way. Fresh nectar and fresh pollen urge the queen to egg laying possibly through chemical stimuli inherent in this newly gathered material.

Any beekeeper knows that robbing begins between major honey flows when nectar is scarce or wanting. If this interim can be filled with a contributory source of nectar, the urge to rob will be reduced to a minimum, provided, of course, that the beekeeper does not create the robbing lust by his own careless operations.

What of major sources of nectar? Can the beekeeper plant trees, shrubs, and flowers that will yield sufficient nectar to be a major factor in his surplus honey production? We know that this can be done with field crops such as the clovers and buckwheat, but the time required for a tree to be fully productive is quite long. The plant-

ing of a few tulip, basswood, or locust trees will repay the cost, however, in a few years in surplus honey from those trees. In addition, many trees, shrubs, and flowers can be planted that will extend the flow of nectar sufficiently to enable the bees to complete the filling of that final super. If one can transplant large trees the yields will be correspondingly greater in a shorter time. A large tulip, basswood, or American holly can produce enough nectar to make surplus honey and without further attention they will continue to increase in nectar yield as their size increases.

The following lists contain principally contributory nectar or pollen sources, some of which can be planted by every beekeeper. Bear in mind in making a selection for planting that there are three critical periods in Maryland for which you should make special provision. These are the early (February, March, and April) period, when bees need the stimulation of fresh pollen and nectar; the period between tulip and clover, which is especially important to the beekeeper who prepares his bees for the tulip flow; and the period subsequent to the clover flow and before the fall flowers come on, when the colony morale is low, robbing general, and a supply of *Lythrum, Clethra,* or *Sumac* will prove of the greatest help to both bees and beekeepers.

In the following lists, where (a) is used as a prefix, it represents early pollen or nectar sources; (b) marks main sources of nectar in some parts of Maryland; (c) marks those sources that will help to fill in the second critical period; and (d) indicates those nectar yielding plants that will serve to carry the bees from the end of the clover flow to the fall forage.

Trees that Secrete Nectar or Pollen

(c) American Holly—*Ilex opaca*
(b) Basswood or Linden—*Tilia* sp.
Black gum or Tupelo—*Nyssa sylvatica*
(b) Black locust—*Robinia pseudoacacia*
Box elder—*Acer negundo*

(c) Chestnut, Spanish or Japanese—*Castanea vesca* and *japonica*
Fringe tree—*Chionanthus virginica*
Hackberry—*Celis* sp.
Indian cigar tree—*Catalpa speciosa*
Mountain ash—*Sorbus hybrida*
(b) Persimmon, American—*Diospyros virginiana*
(a) Red maple—*Acer rubrum*
(a) Sugar maple—*Acer saccharinum*
Sour wood—*Oxydendrum arboreum*
(b) Tulip tree—*Liriodendron tulipifera*
*Varnish tree—*Koelreuteria paniculata*
(a) Willows—*Salix* sp. (Particularly *babylonica* and *vitellina*)
Yellow wood—*Virgilea lutea*

Shrubs

(a) Barberry—*Berberis thunbergii*
(c) Black haw—*Virburum prunifolium*
(a) Bush honeysuckle—*Lonicera fragrantissima*
(b) Button bush—*Cephalanthus occidentalis*
Common firethorne—*Pyracantha coccinea*
Dogwood—*Cornus racemosus*
(c) Elderberry—*Sambucus canadensis*
Gall berry—*Ilex glabra*
(c) Holly—*Ilex verticillata, lucida,* and *decidua*
(c) Hazel or Filbert—*Corylus americana*
(d) Hercules club—*Aralia spinosa*
(c) Indian currant—*Symphoricarpus orbiculatus*
(b) Pepper bush—*Clethra alnifolia*
(a) Pussy willow—*Salix discolor, purpurea,* and *caprea*
(a) Red bud—*Cercis canadensis*
Scotch broom—*Cytissus scoparius*
(c) Spice bush—*Benzoin benzoin*

* This common name is some times applied to **Aleurites,** but **Koelreuteria** is the nectar yielding genus.

(c) Snow berry—*Symphoricarpus racemosus*
(b) Sumac—*Rhus typhina, glabra,* and *copallina*

Vines

(d) Bitter sweet—*Celastrus scandens*
Boston ivy—*Ampelopsis Veitchii*
(d) English ivy—*Hedera helix*
(c) Grapes—*Vitis* (all cultivated species)
Ornamental grape—*Vitis incisa*
(d) Star clematis—*Clematis paniculata*

Flowers

Baby's breath—*Gypsophila paniculata*
(d) Butterfly bush—*Buddleia magnifica*
Dog rose—*Rosa canina*
Fox glove—*Digitalis* sp.
Golden Marguerite—*Anthemis kelwayi*
Gay feather—*Liatris spicata*
(d) Hollyhocks—*Althaea rosea*
Lilies—*Lilium* sp.
(d) Purple corn flower—*Rudbeckia purpurea*
Rugosa rose—*Rosa rugosa*
(d) Speedwell—*Veronica spicata*
(d) Sneezeweed—*Helenium autumnale*
Wichuriana rose—*Rosa wichuriana*
(d) Rosemary—*Rosemarinus officinalis*
(d) Bee balm—*Monarda didyma*
(d) Lavender—*Lavendula spica*
(d) Thyme—*Thymus vulgaris*
(d) Peppermint—*Mentha piperita*
(d) Spearmint—*Mentha spicata*
(d) Catnip—*Nepeta cataria*
(d) Showy stonecrop—*Sedum spectablis*

HONEY AS A DISSEMINATOR OF AMERICAN FOULBROOD SPORES

BY GEORGE J. ABRAMS

American Foulbrood is an infectious disease of the brood of honeybees caused by *Bacillus larvae*. This microscopic, single celled organism differs from the organisms causing the other brood diseases in many ways. One important difference being that it belongs to a group or class of bacteria known to bacteriologists as spore formers. When conditions unfavorable for growth and reproduction are encountered by the bacteria in this group, they contract and concentrate their cellular substance within a thick, tough, protective coating, beneath which they lie dormant until the unfavorable environment has changed. When conditions are again favorable for active growth and multiplication, they germinate not unlike a seed.

This protective armor-like coating possessed by American Foulbrood spores, gives to them certain immunities and protections which they would not otherwise possess.

Resistance to heat is one of the outstanding properties possessed by these spores. Suspended in honey they are able to easily withstand the ordinary bottling temperature of 160° F. In fact a temperature of 212° F. maintained for 30 minutes is necessary to destroy them when suspended in honey.

These spores resist death by drying for years.

The direct rays of the sun, so deadly to bacterial life are unable to kill these spores when they are suspended in honey in less than a month. Six weeks time is often required.

Suspended in honey and shielded from direct sunlight, American Foulbrood spores remain alive and virulent for over a year. This is interesting because of the fact that honey itself possesses germicidal properties strong enough to kill most bacteria which get into it.

In discussing the disinfecting value of honey Phillips writes, "Honey is a disinfectant. This characteristic is

a physical, rather than a chemical one. The power of absorption of water by levulose, tends to eliminate the water from the bacteria which may obtain entrance to honey, with the result that they are promptly killed. Unfortunately the spores of *Bacillus larvae* the cause of American Foulbrood are so thoroughly protected by their outer coat that these enemies of beekeepers are not destroyed by honey."

What I have just endeavored to show is, that, even though the environment within and without the hive may become unfavorable for the growth and multiplication of Bacillus larvae and in fact may become so adverse as to kill ordinary forms of bacteria, still it has no lasting effect upon American Foulbrood spores. This means then, that once these spores have established themselves in an apiary, the beekeepers attention must be immediately and energetically directed toward stopping the dissemination of the spores. This is no simple matter where the infection is one of long standing. Whether of long standing or not, it requires a thorough knowledge of the possible paths of spore dissemination.

Theoretically, there are at least six paths by which these spores may be distributed.

It is theoreticallly possible but not at all probable that the flowers may be an agent in spreading the disease. There are several reasons. First, field bees are usually older bees, which, when honey is to be gathered, do not intimately associate with the brood. They are concerned with the gathering and storing of nectar and their activities before going to the flowers, even though they may have stored their last load in a diseased cell, is hardly such as to carry infection. And if carried and deposited on the flowers, the chances that subsequent visitors to the flowers would carry enough spores back to their hive to cause infection, is so remote and improbable that this possibility of dissemination may be eliminated from serous consideration.

The fact that drones are often allowed to lazily fly in and out of strange hives without molestation is theore-

tically another possibility. That *queens* might possibly transmit the spores is another. However, these too may safely be discarded from consideration.

The water supply has been attacked as a source of dissemination of the spore. It is possible, and there is some indication, that where the bees are gathering water from small stagnant water sources, the disease may be transmitted. Water gathering is carried on extensively in the spring when the colonies are building up and there is abundant young in the brood chamber. This fact contributes to the water supply possibility, inasmuch as there must be larvae of the feeding age in a colony for new infection to take place.

The clothing, hands and hive tools of the beekeeper are not likely sources of infection. Beekeepers as a rule do not get their clothes, hands or tools in contact with diseased material, and in cases where they do, the chances of spreading it to other hives are small.

Since American Foulbrood is so widely distributed, spreads so rapidly throughout infected apiaries, crops up in new localities and returns to old centers of infection, by what means is it disseminated? It must be spread either by honey or by apiary equipment.

Let us *first* consider *honey* as a carrier. Honey has every possibility of being a potent factor in spore dissemination because it naturally comes in contact with the spores, does not kill them, and because it is the one article that all the bees in the apiary are interested in getting into their own particular hive. Since they all want honey and are interested in both large and small amounts of it and possess no moral inhibitions cramping their method of getting it, any honey left exposed or unprotected is promptly transferred to other places. A colony becomes weakened by disease, robbing begins, and the infected honey is transferred to all those colonies strong enough to participate in the pillage. A careless beekeeper examining his hives, drops a frame of honey and the bees gather to gobble up the spill. A hive is left open or the wind blows a cover off and the honey is pillaged. Ex-

tracted honey from one's own apiary or honey purchased on the open market is fed back to the bees. There are dozens of ways in which diseased honey is made accessible to bees from healthy colonies.

Within the confines of the apiary then, honey is the most important agent in spore dissemination. *Relatively,* the rearrangement and manipulation of equipment within the apiary is not as important in the spread of the disease.

It is coming to be believed by those in charge of apiary inspection work, that once outside of the apiary and away from it, honey is not to be regarded as nearly so potent a factor in disease dissemination as *apiary equipment.* Commercial shipments of honey are not believed to spread disease materially, whereas the moving, buying and selling of used apiary equipment is regarded as the chief cause of the spread of American Foulbrood. This is probably a true conception. And for the honey trade it is a happy one, for if it were proved that commercial shipments peddling, etc., of honey were responsible for the widespread dissemination of the disease, ensuing regulations, regarding honey shipments which would surely follow, would no doubt seriously interfere with the present honey trade. And the honey trade appears to be under enough difficulties at present without being further handicapped.

While there does not exist many reliable figures to substantiate the attitude, it is being believed more and more by those in charge of apiary inspection work, that it is through the moving or shipping of diseased equipment that American Foulbrood is spread and *not* through commercial shipments of honey.

Fracker says, "The problem is one of vital importance in determining the relative efficiency of restricting the movements of bees and equipment, as compared with limiting honey shipments. It is clear that if honey passing from place to place in ordinary channels of trade is a prolific source of infection, then American Foulbrood is destined eventually to be universal and a permanent factor in American Beekeeping. Since insurmountable

difficulties seem to prevent effective regulation of the transportation of honey, any possible retarding of the spread of bee disease must come through hindering the movement of bees and infected equipment, and will be successful only to the extent that such movement is now responsible for the introduction of American Foulbrood into new localities, as compared with the proportion of cases which are to be traced to honey shipments."

Fracker, a man of experience in disease control work, believes that the spread of American Foulbrood to new localities is due almost entirely to movements of bees and bee supplies and not to honey shipments.

J. C. Goodman, of Florida, writes, "It is apparent to me that apiary equipment, bees, etc., are *all* to blame for spread of the organism. Most all of our spread is due to equipment being moved from one yard to another."

Harned, of Mississippi says, "We do not have any evidence to indicate that American Foulbrood is more serious near large cities or other centers of honey shipment."

Apiary-inspector Lauderdale, of Mississippi, states: "There is no doubt that all our trouble has come from used bee supplies and the movement of diseased bees."

Robinson of Alabama, believes that American Foulbrood dissemination so far as is known, is correlated with the movement of bees and equipment rather than in honey shipments.

These few brief statements by men, well versed and familiar with the business of disease control, show what the concensus of opinion is coming to be about honey on the market.

It seems to me, that the paramount position which honey holds in the *apiary* as a disseminator of American Foulbrood spores cannot be over emphasized, *but*, the fervor with which many beekeepers believe in the transmission of disease by honey shipments for human consumption can safely be diminished. Their thoughts and efforts can be more profitably directed toward stopping the movements of diseased apiary equipment.

REPORT

of the

Maryland Vegetable Growers' Association

TWELFTH ANNUAL MEETING

FIRST SESSION

(Joint Session with Crop Improvement Association)

January 8th, 1930

The joint session was called to order by Vice-President Harding of the Crop Improvement Association, who called upon Mr. Thomas H. White to start the program.

MAINTAINING FERTILITY FOR TRUCK CROPS

BY T. H. WHITE

Since the time primitive man discovered that the blood and ashes of his victims increased his food supply the maintenance of the soil fertility has been an important question.

Primitive man did not know the reason why he secured so much better growth, where the blood ran, and the ashes of the bones and fire were scattered, so attributed it to some spiritual or unseen power. Thus was instituted the idea of sacrifice to these unseen gods in the springtime asking for a bountiful crop and in the fall giving thanks for the same.

As man gained intelligence these ideas gave way to reasons more nearly correct until we now know that it was the ammonia, phosphoric acid, calcium, potash, and a few other minor elements that gave the increase.

Thousands of men have worked and tons of records of results have been distributed regarding this subject, so

that at the present time the maintenance of fertility, is rather a simple, though somewhat expensive matter.

We do not now have to depend on the blood and bones of animals or the ashes from the burned wood for the potash, for what was obtained from the blood is now obtained from the air, and that from the bones and ashes is taken from the rocks and salt mines, and we can therefore proudly point to the fact that in this respect farming has kept pace with the rest of the world by using machinery, electricity, and chemistry to provide fertilizers for the soil.

After man began to domesticate animals, and to use them to help feed him and cultivate the crops, he found that in the manure he had a cheap and abundant supply of soil fertility. In the older countries of the world their agriculture was built up largely on this stable manure, and when judiciously used, the results were always good, and after all our investigations and experiments, I think we may safely say that nothing has been discovered that is any better or perhaps just as good. Still I think we may be thankful that we have something that we can use to supplement or substitute for these manures.

In the few minutes allotted to me I shall not have time to go very widely into this subject of the Maintenance of Fertility, so with your consideration, I would like to discuss it from the standpoint of our own experiments and observations, which have extended over a period of thirty years.

While there is still much inquiry as to which is the best fertilizer for this or that crop, beans, tomatoes, corn, cabbage, or whatever one is most interested in, still I think the more important question is: "How much should be used per acre to produce good paying crops and also keep the soil fertile?" There is much fertile soil, made so by the gardeners in the good old days by dumping from ten to forty tons per acre of stable manure on each acre, that will become less productive if a continuous supply of plant food is not judiciously supplied. As the city supply of stable manure is practically gone we now have

to depend largely on the chemical fertilizers. Taking into consideration the more important elements of plant food we find that a ton of stable manure may be expected to contain twelve pounds of ammonia, five pounds of phosphoric acid, and ten pounds of potash. If we apply fifteen tons of stable manure, as a fair average dressing per acre for truck crops, then we put into the soil: one hundred and eighty pounds of ammonia, seventy-five pounds of phosphoric acid, and one-hundred and fifty pounds of potash. Using commercial fertilizers to supply this amount of plant food it would be necessary to apply one ton of goods analyzing 9-4-7 to each acre. A brand such as this, which is somewhat richer in potash than the ten percent brand advocated for tobacco beds, etc. would cost around $48.00 to $50.00 per ton. Can we afford, and is it practicable, to put $45.00 worth of fertilizer each year on each and every acre of our land? What do the experiments, that have been made along this line, indicate? The Maryland Agricultural Experiment Station has been looking into this matter for the past thirty years, and I shall speak of these investigations because I am more familiar with them, and know about the conditions under which they were carried on, and for this reason can speak quite confidently.

Some results published in 1909 show that for late cabbage planted on timothy sod plowed early, using 750 pounds of a 5-7-7 goods gave an increase of $118.00 with an expenditure of $11.00 for fertilizer.

After the cabbage, rye was sown, and the rye was turned under in the following spring, and sugar corn planted. The stand was poor and the season was wet, so that no records were kept of the yields. However crimson clover was sown in the corn and was plowed under the next spring.

Late cabbage was again planted, and although the crop was poor the 750 pounds of fertilizer made a gain of $20.00 per acre. The following spring the plots were again fertilized and early potatoes planted. The crop was poor, but after the cost of the fertilizer was deducted

there was a gain of $10.00. After the potato crop, alsike clover was sown. This was nearly all winter-killed so that the land was disked over and a mixture of alsike and red clover was sown. This made a good stand and late in summer it was cut and left on the land.

Hay was cut the next season and the fertilizer made a gain of $19.50. The following spring the land was plowed and late cabbage was again planted. This crop made a good increase from the use of the fertilizer so that in summing up the six years totals the fertilizers made a gain of $287.08 after paying for the fertilizers which cost $44.32.

A similar experiment using commercial fertilizers that would supply about the same amount of plant food as fifteen tons of manure, resulted in a gain of $33.15 when 2150 pounds of fertilizer were used and a gain of $38.12 when 750 pounds of the same was applied.

At the end of five years, using rye and crimson clover as cover crops during the winter, and cabbage and potatoes for the money crops, there was a gain of $153.75 for the larger amount and $154.37 for the 750 pound application.

On another series of plots of loam soil of fair fertility, using 2600 pounds per acre of a 4-7-9 analysis, and for comparison with this twenty tons of stable manure, (valuing the stable manure at $2.00 per ton and the fertilizers at the prevailing prices), there was a loss for the first four years, the crops harvested not being sufficient to pay for the plant food. Early peas was one of the crops used on this series, and the fertilized plots did not yield enough more to balance the cost. These plots were continued for twelve years, supplying more fertilizers only once, that being eight-hundred pounds per acre of super-phosphate for tomatoes. After twelve years the gain for the twenty tons of manure was $204.49 and for the commercial fertilizers $123.91.

Another series of plots treated with commercial fertilizers at the rate of six-hundred pounds per acre per year for twenty years, eighteen years of which sweet

potatoes were the only crop planted, and the last two years beans and potatoes gave a net profit for the fertilizer of $535.07 or $26.75 per year after the fertilizer was paid for. In this connection I may say that the profit from the use of five tons of stable manure in the row was $38.53 annually.

More recent investigations just published in bulletin 309 give results of applying amounts of commercial fertilizers of good grade from five-hundred pounds up to 1500 pounds per acre per year and amounts of stable manure of four, eight and twelve tons, over a period of thirteen years. The results show that while not quite as large crops were secured by the fertilizers alone as there were on the manure or in combination with the fertilizers, still the yields were good and all three of the different amounts made profitable increases. Using cabbage, corn, early peas, spinach, and sugar corn, the net gains for the 500, 1000, and 1500 pounds respectively were $663.00, $1,002.00, and $1,166.00. The first 500 pounds of commercial fertilizer gave the largest increase. If each 500 pounds in the larger amounts used had given as much increase, then the profits would have been $663.00, $1,326.00, and $1,989.00 respectively. So that you may make some comparisons, I will say that this was true also of the stable manure (which in this case was valued at $5.00 per ton), which made gains of $799.00, $1,040.00, and $1,261.00 from the four, eight, and twelve tons respectively. You will see that in this case also the first four tons made the greatest gains. If each four tons had done as much good to the land and crops as the first four tons, the gains would have been $799.00, $1,598.00, and $2,397.00 respectively. To get at the profits from the use of fertilizers in another way, we may divide the gains by the tons of fertilizers and manure used. When this is done we find that the first five-hundred pounds of commercial fertilizers per acre, was worth $221.10; the 1000 pounds $167.00; and the 1500 pounds $129.59 per ton. The highest cost price for any of the fertilizers used was $50.00 per ton. In the same way the first four tons

of manure were worth $16.65 per ton; the eight tons were $10.84; and the twelve tons $8.70.

On the plots where half the amounts of both the manure and fertilizers were used the gains were slightly larger, which would indicate that a combination of the two, where some manure can be obtained, would be better than the commercial fertilizers alone.

The different crops showed considerable difference in their response to the fertilizing. Thus we find that where early potatoes are considered, the 500 pounds of fertilizer gave an average increase for the three seasons grown, of 226 percent, for late potatoes, 169 percent, for spinach, 413 percent, for cabbage 213 percent, for tomatoes 183 percent, and for sugar corn 132 percent. This, I believe, is about what is usually considered in practice. Very rich land for early potatoes, spinach, and cabbage, somewhat less so for tomatoes and sugar corn.

No green manure or cover crops were used on this last series. The fodder of the sugar corn was taken off and fed. Cabbage stalks and loose leaves, tomato and potato vines were left on the land. Generally some small weed such as chick weed would make a winter cover for the land.

From the results secured it would seem that there can be no question of the fact that it pays to fertilize. Whether it solves the question of how much fertilizer should be applied is, it must be admitted, doubtful. All the results point to the fact that undue increase of fertilizers means diminishing returns or profits. This falling off in profits would probably occur much faster after the first fifteen hundred pounds per acre. There would seem to be justification sometimes of the larger amount on early potatoes, but for late potatoes the percent of increase was lower than the 1000 pound application. Spinach the two years planted gave an average increase of 136 percent for the 1500 pounds over the 1000 pounds. For sweet corn the difference is so slight that it would seem that 500 pounds per acre is all that would be judicious to apply. For late cabbage, which is generally con-

sidered a gross feeder, the limit was not quite reached in the 1500 pound application, but the margin was very slight.

It would seem then that we need not be fearful of maintaining fertility so long as the commercial fertilizers can be secured. All the experiments tend to show too that they can be profitably applied in amounts up to 1000 pounds per acre per year for most of our vegetables and as high as fifteen hundred for early potatoes, spinach and cabbage when the crop is grown for early use. For the summer crops, the warm soil conditions will make for a rapid root development, allowing the plant to reach more plant food than is possible for the plant growing in the cooler season of the year. In the maintenance of fertility we must certainly consider the effect of turning under so-called green manure or cover crops. Of these the best are undoubtedly the legumes. We have had a good deal of experience with them and while turning under any green material is always a benefit to the crop and soil if turned under early enough, the results are not apparently as uniform and positively beneficial as are the applications of commercial fertilizers.

With regard to a winter cover crop of rye sown early and plowed under early in the spring for early potatoes and other early vegetables, the rye cover made an average increase in the value of crops as a fraction over $9.00 per acre per year, over a period of twelve years. In order to get a cover crop of rye of this character, it must be sown about the middle of September.

When rye was sown after late crops like tomatoes and late cabbage, the fall growth was not sufficient to make much winter cover, and was turned under when coming into head, and so to be considered green manure, the average increase in the value of the crops was $7.41 per year.

Some other experiments in which a piece of fertile garden soil was used, and which had been cropped for several years using commercial fertilizers only, did not show any marked benefit from the plowing under of two

crops of cowpeas and rye on early potatoes and peas, but cabbage and spinach yielded somewhat better.

Land should not be allowed to lay bare at any time if possible, and certainly not over winter. Crimson clover can be sown at the last cultivation of the summer crop and with the clover some turnips may be sown. These will not seriously interfere with the crimson clover and will help to pay the expenses. Kale is a useful crop in truck gardens and if sown early will make a winter cover with some profit from the sale of it in the spring. Vetch and sweet clover when sown about the middle of August will make a fair winter cover with quite a mass to turn under in the spring. When the land is good enough to produce a summer crop commercial fertilizers should be used to produce a money crop and the organic matter should be supplied by the use of so called catch crops that will grow through the fall and winter months.

In handling land of only moderate fertility, it is well to bear in mind that crops which are to make their growth through the summer will do better and yield more with less fertilizing than those that make their growth in early spring. For instance, if the land is thin, plant crops like tomatoes, corn, and late cabbage and late potatoes rather than early peas, spinach, or early potatoes and cabbage. Do not expect the green materials that are turned under are going to give as good results as stable manure. There is no doubt that when used as a winter cover they aid greatly in preserving the fertility of the soil, but they should be turned under while in a green and succulent condition so that decay will be rapid and thus return to the soil what they have taken from it, as well as the supply of nitrogen, if legumes, that has been gathered from the air.

It must be remembered that stable manure brings plant food and organic matter from other sources than the piece of land to which it is being applied, so there is no possible doubt about it adding fertility, but plants that grow on the land take their plant food first from the soil, then if they are legumes will later on manufacture some

nitrogen from the air. This that comes from the air is the most important contribution in the way of plant food, hence we should always if possible use the legumes and see that there are bacteria supplied that will make the nodules on the roots.

In conclusion then I will say that all our investigations show that it pays to use commercial fertilizers to grow truck crops. That proportionately the profits will lessen when a certain point is reached as the amount of high grade fertilizers are increased. The largest percent of increase is from the first five-hundred pounds of fertilizers or from four tons of manure. Early potatoes, early spinach, and early cabbage require richer ground and heavier fertilizing than crops that make their growth during warm seasons of the year.

A paper on "Tomato Fertilizers for Quality," by R. P. Thomas, and a paper "Fertilizers for Potatoes," by J. E. Metzger and E. H. Schmidt were presented at this session and are printed in the report of the Maryland Crop Improvement Association.

PRACTICAL ASPECTS OF PAPER MULCH

By L. H. Flint,

Associate Physiologist, Biophysical Laboratory,
Bureau of Plant Industry,

U. S. Department of Agriculture.

Introduction

The agricultural use of paper mulch in the Continental United States began in 1928 with a modest experimental application. The initial sales of mulch paper were limited to a few rolls per person, but were nationally distributed and effected an estimated aggregate coverage of about five hundred acres. The initial use of paper mulch thus brought it into contact with a great diversity of soils, climates and crops. At the same time, no serious

attention had been given to the working out of methods of adaptation to the culture of any one crop in any region. Approximately 85 per cent of the trials represented successful adaptations of a new process to old yet diverse problems, ranging from those of the home gardener to those of the grower of specialized and general crops. The trials were small and inexpensive—yet very suggestive. Some growers were interested chiefly in larger yields, others in earlier crops, others in weed suppression, others in disease control and others in various and sundry aspects of the process. This interest, based largely upon the trials of the first year, resulted in a remarkable extension of the application of paper mulch in 1929, when the estimated aggregate coverage ran well above five thousand acres. This application consisted not only in a large number of additional small trials by growers inexperienced in the use of paper mulch, but also in more extensive coverage by those who had attained some familiarity with it. This latter use related more directly to the economy of the practice in agriculture, and consisted in trials of sufficient acreage to be not only suggestive but significant.

The major economic function of paper mulch is ordinarily its stimulation of the crop plant. The general effectiveness of such a mulch is now established beyond all question. The economic utilization of paper mulch for the improvement of agriculture is now well under way, even though the knowledge of the methods of obtaining the maximum benefits under different conditions is far from complete. A greater knowledge or wider recognition of the factors responsible for stimulation may be expected to contribute to the more intelligent application of paper mulch, which, in turn, relates to its economic use. Even under the most perfect manipulation, however, the extent of crop plant stimulation with paper mulch remains associated to a large extent with climates, seasons, soils and crops, while the economic use of the mulch is further complicated by considerations of production costs and markets.

Figure 1. A field of muskmelons growing on paper mulch—Long Island, N. Y.

Figure 2. The use of paper mulch in the plant row only. Field of cabbage and cauliflower growing on paper mulch near Buffalo, N. Y.

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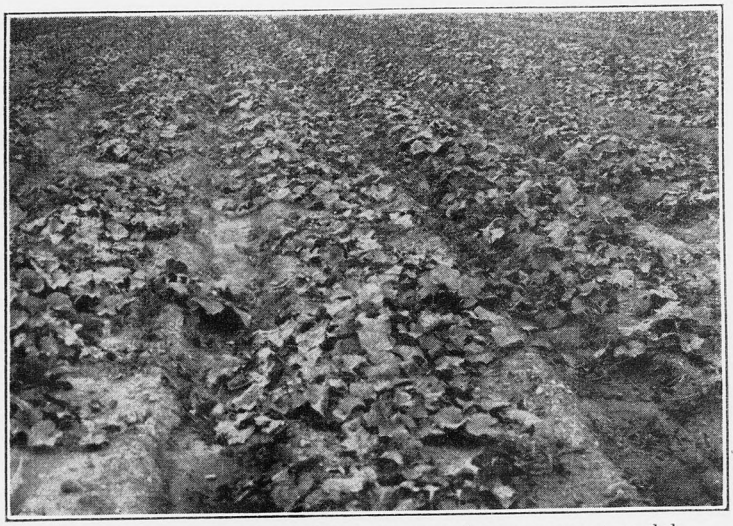

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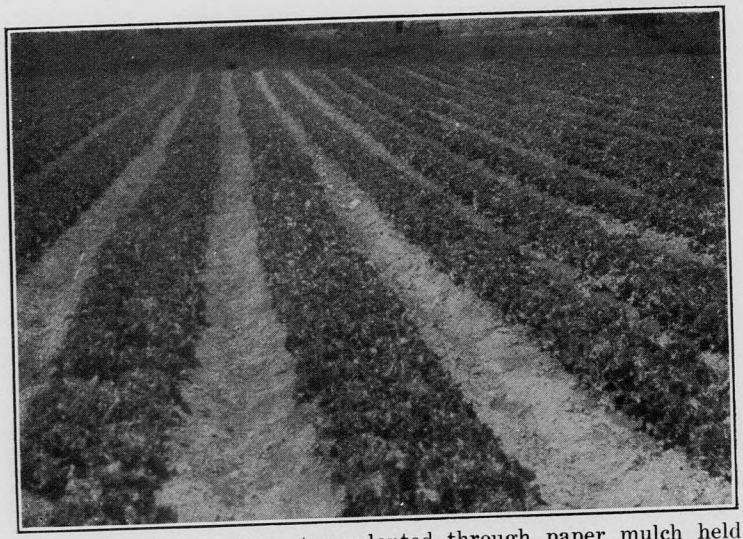

Figure 3. Head lettuce transplanted through paper mulch held with soil over edges. Field near Buffalo, N. Y.

Figure 4. Onions transplanted through paper mulch held with soil over the edges. Near Buffalo, N. Y.

As the use of paper mulch passes from small experimental comparisons to field practice there is unfortunately less opportunity to obtain quantitative data regarding the effect of the paper. In the majority of cases all crops to which the process had seemed adapted were being grown with paper mulch only, the growers accepting the evidence of their early trials. When the importance of continuing with comparison areas was pointed out to them the characteristic reply was to the effect that they had been growing crops without paper "for forty years" more or less and were quite familiar with the growth that could normally be expected.

Notwithstanding this situation, however, the most reliable information concerning the practical aspects of paper mulch at the present time is to be found in the experiences of interested growers extending early trials into increased acreage. The growers of crops with a low value per acre have very generally considered paper mulch as of little value at the present costs of suitable papers. Perhaps a majority of the growers of the more valuable crops are convinced that paper mulch may be of value to them but have realized that trials were in the experimental stage and have preferred to await developments. Some few growers of these crops have not credited paper mulch with any economic possibilities in this country.

To an appreciable extent both the State Experiment Stations and the growers of specialized crops have been interested in seriously testing the nature and extent of crop plant stimulation with paper mulch with a view to the determination of its practical value in the different regions and for the various crops. Appreciating the great possibilities associated with the practical adaptation of paper mulch to various phases of our agriculture the Department of Agriculture has kept in touch with the progress being made in this direction, and during the 1929 season conducted an inspection of a representative number of outstanding tests by practical growers and by Experiment Stations throughout the area east of the

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Mississippi. This circular is a summary of the results thus far obtained in the extending use of paper mulch in this country and their interpretation as a guide to further procedure relating to the practical utility of the paper mulch practice.

Relation of Paper Mulch to the Practical Culture of Representative Crops

I. GENERAL FIELD CROPS

Among the most valuable and extensively-grown products of agriculture are those produced from annual plants in general field culture. Aside from considerations of soil moisture and fertility the production of some of these crops, such as wheat, oats, etc. involves little attention during development. Others, on the other hand, such as corn and cotton, are given weeding and cultivation throughout the early period of their development. The present cost of paper as used in the production of crops of this type is about $35.00 per acre, in consequence of which its general economic application to crops with a low value per acre such as field corn, cotton and beans is not to be expected regardless of the fact that the process is effective with these crops. With the more valuable of the field crops, however, such as tobacco and potatoes the possibility of utilizing paper mulch is receiving serious attention and trial.

Tobacco. The favorable response of both the Sumatra and the broadleaf types of tobacco to paper mulch has been demonstrated by trials well distributed throughout the eastern states. This response has indicated more rapid development, increased yields, and superior quality of the mulch-grown product. Type A papers were used in these trials, in part with one-half soil coverage, as in pineapple culture, and in part with complete soil coverage. In a number of trials with tobacco the application of fertilizer was reduced sufficiently to defray the entire cost of the paper without reducing the yield. Although such results are suggestive, they may be of very limited

significance. The trials were largely confined to open culture tobacco, and nothing is known regarding the influence of paper under shade.

In most cases soil has been used for holding the paper. The machine-laying of the paper in connection with the planting was receiving attention, and appeared essential to the general usefulness of paper in tobacco culture. As a whole the adaptation of paper mulch to the production of this crop seems to offer sufficient promise to warrant the serious attention which is being given it by growers.

Potatoes. The response of this highly important crop to the use of paper mulch has been variable. In some cases marked results in hastened maturity and increased yields had been obtained. In other cases no marked differences between mulched and unmulched fields could be observed. The impression was rather general in the more southerly portions that the lighter-colored papers were preferable for this crop, but the situation had been complicated by excessive fertilizer applications in connection with the paper.

Ordinarily earliness did not command a premium in the marketing of this crop. The use of paper, moreover, was not readily adapted to hill culture, although it may supplant the advantages of hill culture, particularly since satisfactory returns have been obtained with type A papers in flat culture. The practical usefulness of the process for the culture of potatoes on any extensive scale appeared to be rather closely associated with the development of a suitable paper-laying attachment for use with the planters.

The favorable influence of paper mulch in the culture of sweet potatoes has been widely demonstrated, and as in the case of white potatoes, paper-mulching machinery appeared to be an important factor in the determination of the practical value of the process for the culture of this crop.

Sweet corn. When grown for early market the hastened maturity characterizing the use of paper mulch with this crop appeared to make the process of wide in-

terest in its commercial culture. In some of these cases sweet corn had been intercropped with vegetables such as beets, Swiss chard, etc., type B papers having been used in 18 inch widths in the methods described for drilled crops. In other cases sweet corn had been grown by hand planting through 18 inch papers of type A, the papers being held with soil over the edges.

Mulch-grown sweet corn usually matured from five to fifteen days earlier than that grown without the paper. When earliness did not command a premium the use of paper mulch was not generally indicated as an economy in its culture.

II. TRUCK AND VEGETABLE CROPS

Muskmelons, watermelons, squashes, etc. Field seeding of the above-indicated crops was successfully accomplished by hand through small openings in the mulch paper made by removing small disks with a knife. The type A papers were laid by means of various simple devices some being horse-drawn and others tractor-drawn. These effected the complete sealing of all edges of the paper with soil, in addition to which small amounts of soil were placed on the paper at fifty-foot intervals to take care of longitudinal shrinkage. Such methods effected a covering of about one-half the soil surface, though in some instances the interval between the crop rows had been reduced.

Fairly satisfactory home-made laying devices had been constructed from machine-cultivators through the addition of carrying and feeding bars. A firming roller had also been used in connection with such a laying device, the roller in some instances having been provided with pegs for making planting openings at the desired intervals. Field seeding or transplanting had been accomplished by hand through such openings, in other cases through openings made with a dibble or knife.

The plants grown with paper mulch in general excelled those of the unmulched areas throughout the sea-

son, the yield being increased and the maturity hastened. A representative field of muskmelons planted through paper laid as above described is shown in figure I.

In some situations especially subject to winds, vine crops were damaged by being blown about on the smooth surface of the paper. Some growers had overcome this difficulty by the addition of a few seeds of velvet bean or similar plant to each hill or by leaving a small amount of soil on the surface of the paper near the hill at the time of planting.

Tomatoes, peppers, cauliflower, etc. In the field culture of crops grown from transplants for early fresh market the double row system of staggered plants set through type A papers held with soil over the edges was indicated as profitable in the hands of experienced growers. Both the 18″ and 36″ widths had been used for the plant rows, the inter-rows having been machine-weeded as in unmulched cultural practice. The system of paper mulching involving the maximum soil coverage is usually most effective from the standpoint of crop-plant response. This system was in commercial use to some extent, and had distinct cultural advantages, since it eliminated machine-weeding as well as hand weeding. The half-coverage system, on the other hand, was less expensive and more easily applied, and was the one in most extensive use with these crops. The use of paper mulch in the plant row only is indicated in figure 2.

Onions, celery, lettuce, etc. In the field culture of onions from sets or transplants and of celery and lettuce from transplants two general methods of applying paper mulch had been used with success. In one of these the paper was held with soil over the edges and the plant had been set through openings made with a dibble at the desired intervals, several rows having been set on a single strip of paper. In the second method the plants had been set along one edge of a strip of paper held with wire staples or stapled laths, following which the second strip had been laid and the planting continued. The first method effected maximum weed suppression and per-

mitted the use of type A paper. The second method, employing type B paper, was well adapted to double cropping or to a succession of crops in areas in which weed suppression was a less serious problem. The two methods are shown in figures 3 and 4.

Carrots, beets, etc. The practical use of paper mulch in the extensive field-seeded culture of the above-indicated crops appeared to involve for the most part double cropping or successive cropping systems except of areas essentially weed free. The methods being used effected a complete covering of the soil except the portion occupied by the plant row, and for the most part the paper was held with wire staples or stapled laths. In connection with hand seeding it was customary to lay a strip of paper, plant along one edge and follow with a second strip, etc. In connection with machine seeding the spacing of the rows had been adjusted to accommodate a strip of paper between, and the laying of the paper followed immediately the drilling in of the seed.

At the present time the most successful adaptations of the paper mulch system to the culture of the small-seeded drilled crops have been those in which these crops have been grown between rows of sweet corn or in which two or more crops were grown on type B paper in the same season without any intermediate preparation of the soil, one crop being put in as another was taken out. The crops first to be grown in such a succession were, of course, limited to those which would be harvested without disturbing the paper. The type B paper withstood the walking necessary in hand weeding during early development and the cost was chargeable to two or more crops. The soil fertility was maintained either by the initial use of slowly-available fertilizers or by top dressings of readily soluble fertilizers applied to the surface of the paper and carried into the soil by rain or irrigation water.

On areas in which weed control was not a serious problem type A papers had been used with some success for certain drilled crops, but even under such conditions the more durable papers appeared preferable wherever

double-cropping or successive-cropping systems could be used.

III. ORCHARD AND VINE CROPS

The use of type B papers for mulching perennial crop-plants in this country involves not only its effectiveness during the growing seasons but also its relation to root-growth during the intervening winter periods. The study of the effect of winter mulching was one of the interesting developments of the process, but as yet very little has been found out about it. On the basis of the results obtained during the growing season alone, however, the use of small 3′x3′ or 6′x6′ squares of durable paper about young trees or vines at the time of their establishment in permanent orchard plantings has given results which have led to extended trials with apples, oranges, peaches, figs, pecans, walnuts, grapes, etc. Such use of paper mulch brought about weed suppression without the clean cultivation which often resulted in injury to the roots or stocks of young fruit trees or vines. The growers carrying on these trials have for the most part been favorably impressed with the results thus far obtained, and some of them even at this early date feel that the paper mulch is an economic asset in the establishment of their orchard plantings. As a safeguard against field mice it has been customary to place a few grains of poisoned wheat on top of the soil about the base of the tree before applying the paper.

As applied to orchard crops the paper was usually more durable when held with wire staples on the overlaps and outer edges, though soil was used with satisfactory results in some trials. The cost of paper mulching as used in the establishment of orchards has varied with the particular paper used, the size of the "tree squares" and the planting intervals, but most growers do not consider it as prohibitive.

Experiments involving the application of paper mulch to older established orchard trees are in progress, par-

ticularly with reference to increased size and quality of the fruit. Such an extension of the process involved greatly increased expense, however, and is not to be considered on a large scale without preliminary study of the effect of the mulch in small representative areas.

IV. SMALL FRUITS

The experimental trials with type B papers in the commercial production of such crops as strawberries, blueberries, raspberries, etc., demonstrated that this type of plant responds readily to the paper mulch, although the trials have not been of sufficient duration as yet to indicate the economy of such use. In the case of strawberries the paper had distinct advantages over the straw mulch as regards weed suppression, moisture retention and earliness. The effect of the paper was to increase earliness from four to twenty days. Two methods of application to strawberries were in experimental use. One method consisted of a complete soil covering, the plants having been set through notches in narrow paper at the desired intervals, and the paper held with staples or with soil. The other method consisted of a half-soil covering, several rows of plants having been set through wide paper held with soil over the depressed edges. In relation particularly to strawberry culture some difficulty had been experienced in the southern states in holding the paper with the light soils readily moved by wind or rain, and in some trials the papers had not been of satisfactory durability. The advantages of paper as a mulch for strawberries were further offset by the fact that the paper prevented the establishment of runners, so that its use was not readily adaptable to the matted-row systems of culture. On the other hand, when plants had been set out in the fall this objection was not serious, as all plants desired were set out at the time of establishing the bed. The higher temperatures associated with the paper tended to promote root growth during the cooler periods, resulting in more productive plants. The system also appeared to be of especial interest in the culture of ever-

bearing strawberries. The paper was indicated as of further advantage over the straw mulch in that it would not as readily harbor the rot fungus so often troublesome during wet weather. The application of paper mulch, for growth stimulation purposes, to strawberry beds already established was generally unsatisfactory, but trials were in progress in which the paper was laid over the beds in the fall as a protective winter covering. In general there are certain advantages associated with the use of paper mulch on small fruits that have been demonstrated but further experimentation is needed before these advantages are incorporated into agricultural practice.

V. BULBS AND FLOWERS

The possibilities of economic adaptation of paper mulch to the commercial culture of various kinds of flowering plants for bulbs or flowers have been demonstrated by the results of experimental trials by growers. The type of paper used and the method of its application varied with the plant grown. Type A papers were more commonly used with annual plants and type B papers with perennial plants. In the production of bulbs and corms, type A papers were used for spring planted stock and type B papers were used for the fall plantings.

Some commercial flower growers were much pleased with the progress which they were making in adapting paper mulch to their cultural problems, and were extending its application. Others were not yet satisfied with the paper used or the method of holding it, and were continuing their experiments further on a small scale. A trial of paper mulch on about fifteen acres of bulbs was in progress in one of the southeastern states.

VI. GENERAL NURSERY STOCK

A considerable number of paper mulch trials with young coniferous and broadleaved evergreens, perennial flowering plants, etc. have been initiated. These trials

have included seedlings, cuttings and grafted stock. Type B papers have been used for this propagation work, and although many of the plants used are slow-growing and the trials are still in progress, a number of growers have reported paper mulch as an economy in the production of their stock. The most successful adaptations appear to be those involving complete soil covering with type B papers held with staples or stapled wires. When held in this way the plants are set through notches along one edge of the paper, the second strip being then overlapped and held with small staples or with a strand of number twenty wire stapled with heavier wire at suitable intervals. Although this system has a disadvantage in soils subject to heaving, in that the wires become loosened, it is probably the most satisfactory method in present use.

Relation of Paper Mulch to General Problems in Agriculture

It is recognized that general problems in agriculture sometimes become greatly changed by local conditions. However, certain aspects of paper mulch use have rather general application to the culture of all crops.

I. SOIL MOISTURE

The maintenance of soil moisture is fundamental to all agricultural activity and frequently such maintenance represents an appreciable item in the cost of producing the crop. The depletion of soil moisture in unproductive ways is attributable for the most part to the presence of weeds and to evaporation from the soil surface. The usual methods of destroying weeds by hoe or machine result also in drying out the top soil.

On the other hand, paper mulch suppresses weeds without drying out the top soil, and insures the decay of the germinating weed seeds so effectively as to result in making this additional nutrient material available to the crop plants. In thus reducing the water loss from the

soil surface there is made available a relatively fertile top soil whose moisture content in the absence of paper is ordinarily more or less deficient.

The moisture and fertility lost through weed growth is so appreciable that weed control is generally recognized as essential to crop production. The water lost from soil by evaporation from the soil surface is variable with temperature, wind and humidity, but frequently is also appreciable. Quite as important as the reduction of these losses, however, may be the maintenance of the moisture in the top soil, particularly in connection with the culture of crop plants characterized by surface-feeding roots.

Quite naturally paper mulch has limitations in the conservation of soil moisture, and some of these limitations have been forcefully brought out in the practical trials. In some cases, for example, the paper was applied after the soil had dried out, so that there was little moisture to conserve. The lateral movement of subsequent rainfall into dry soil under the paper may be assumed as very slow in comparison with its lateral movement when the soil under the paper is moist. Similarly, the soil moisture conserved by the paper has in many instances not been sufficient to sustain growth in protracted periods of drought.

The conservation of soil moisture effected by the paper proved harmful in some cases in which it was used during periods of heavy rainfall, or on poorly drained land, or in connection with irrigation at rates generally favorable to unmulched soil. The unfavorable results thus effected were in part attributable to the excess moisture as influencing plant growth and in part to the fact that such excess moisture unduly hastened the disintegration of the soil-covered paper. It was apparent in a number of instances that the excess moisture could be avoided by growing crops on slightly elevated beds or by reducing the irrigation water, and beneficial results were later obtained from the paper through such practices. While it may now appear that such experiences might have been anticipated, it is to be remembered that it is largely

through trial and error that real progress in the practical use of paper mulch may be expected.

II. SOIL FERTILITY

The maintenance of soil fertility is essential to crop production, and next to soil moisture constitutes the most universal problem in agriculture. In part certain mineral nutrients are characteristically supplied in adequate amounts by solution from the inorganic soil components, and their maintenance involves only the soil moisture necessary to dissolve them. In part, however, other dissolved mineral nutrients are characteristically present in inadequate amounts or are subject to depletion, and the maintenance constitutes a problem relatively independent of their moisture relations to the soil. Such nutrient materials as thus limit growth must be supplied, either as soluble salts or as organic materials subject to the reorganization actions of soil microorganisms. The addition of soluble salts effects a ready supply of nutrient ions in the soil moisture, but this supply is ordinarily subject to depletion—its value in crop production being dependent upon relative utilization by the crop plants as against dissipation by weed growth, by microorganisms, or by leaching. The addition of organic materials effects a supply of nutrient ions in the soil maintained through the activity of microorganisms and subjected to depletion as with inorganic materials, such depletion being more or less modified by the presence of residual organic matter in the soil and by the acquisition of atmospheric nitrogen in connection with chemical reactions involved in the disintegration of the organic matter.

Regardless of the methods employed in the maintenance of soil fertility the use of paper mulch, as previously suggested, has increased fertility by making the top layer of soil available to the roots of crop plants. When soil fertility is primarily dependent upon the reduction of organic materials in the soil, paper mulch through its increase of soil temperature and moisture may hasten the

conversion of these materials into available plant food. Paper mulch was further indicated as conserving soil fertility through the reduction of the losses occasioned by weed growth. On this account it has occasionally developed that mulched crop plants have been injured by fertilizer applications which in the absence of paper were so quickly reduced as to give no burning effect. In some instances, particularly in the South, this fertilizer injury has been erroneously attributed to higher temperatures on the paper. The efficiency of paper mulch in increasing and conserving plant nutrients is now generally taken into consideration and less fertilizer is used. In some trials appreciable reductions of fertilizer applications were advantageously made when the paper was used, even to the extent that the saving in fertilizer cost paid for the paper.

III. SATISFACTORY PRODUCTION COST

In general the relative value of different crops grown on the same unit area is proportional to the cost of producing the crop. The crop plants which make heavy demands on soil moisture and fertility, or which will not readily tolerate minimum amounts of these resources characteristically have a relatively high cost of production and value per acre. As previously indicated, the relation of weed control to the maintenance of soil moisture and soil fertility is a very vital one. The cost of weed control increases with enhanced supplies of moisture and nutrients, and in the specialized crops constitutes an appreciable percentage of the total cost of crop production. In the crops with a medium to high value per acre, therefore, paper mulch appears to have merited consideration as a means of attaining weed control and eradication.

In general the distribution of weed seed is confined to the top layer of soil ordinarily subjected to alternate wetting and drying under rainfall conditions. Under such conditions the drying out of the top soil delays the germination of many seeds until subsequent rains, with

the result that weeds constitute an all season menace. It has been suggested that when paper mulch was used, the warm moist soil under the paper stimulated the germination of the weed seeds, but that without light the young plants soon die and become incorporated with the soil. Any such advantage would, of course, be peculiar to the types of weeds spreading chiefly by seeding. It has further been suggested that in suppressing weeds at the outset the local development of seed is cut off, and several growers who have used paper mulch for a number of years have noted reduced weed infestation. Even very hardy and persistent weeds, reproducing vegetatively in the lower soil layers, will not long tolerate the absence of light.

The use of paper mulch for weed control thus points a way to weed eradication, and as a means of solving the problem of weeds it may be of greater economic value than in its more direct relation to crop production. In this connection it has been of interest to note that some growers are using paper mulch with the low value crops for the express purpose of effecting the eradication of particularly noxious weeds responsible for trouble of long standing. The efficiency of paper mulch in weed control and eradication is further emphasized by the fact that in the ordinary methods of weed control by hoe or machine many crop plant feeder roots are cut off unavoidably and with harmful results.

The use of paper mulch in relation to weed control and eradication is not without its limitations. The paper as ordinarily used at present in the field culture of crop plants is chiefly effective in reducing the hand weeding within the row, the weeds between the rows being taken care of by the less costly machine operations. Complete soil covering with the paper, while more effective in weed suppression, approximately doubles the cost of application per acre. Moreover, the eradication of the more persistent perennial weeds has been complicated by the difficulty and expense of maintaining a complete soil covering for any appreciable period. In the growing of drilled

crops between strips of paper the weed growth, if not early removed, is stimulated by the paper.

IV. GENERAL ECONOMIC CONSIDERATIONS

With present agricultural activity conducted on principles largely analogous to manufacturing, marketing the crop at a profit is essential to the maintenance of the industry. With many of the more staple crops efficiency of operation involves to a large extent the relation between the yield and the cost of production. The use of paper mulch in the commercial culture of such crops represents an expenditure of the order of thirty-five dollars per acre for paper, with an additional charge for laying.

The extent to which increased yields may be expected from the use of paper mulch varies with crop and climate. In general yields have been substantially increased with all crops. In some instances very high increases have been obtained by practical growers, but these high percentage increases characteristically involved trials on soil of low fertility, or trials in which the effectiveness of the paper in establishing the stand of crop plants was not offset by replacement or reseeding on the unmulched areas. Fortunately experienced growers realize that the significance of percentage increases is largely a matter of the yield obtained without treatment. This point is well illustrated by the fact that in the Hawaiian Islands the use of paper mulch has permitted successful pineapple culture on certain dry areas which without paper would not sustain the growth of the plant. From comparable mulched and unmulched plots in these areas the percentage increase would approach infinity.

The above-indicated cost of paper mulch when considered strictly in relation to crop yield prevents its economic application to crops with a low value per acre. The cost of paper, however, is in a measure offset by reduced production costs, and its use in some instances may be justified by particular relationships to weed eradication, disease control, etc.

With many of the more specialized crops, early marketing is frequently of greater significance than increased yield, notwithstanding the fact that production costs are relatively high. This is particularly evident with the fresh-consumption market crops in which hastened maturity is related to the high early market prices preceding the period of abundant local supply. While there is an appreciable diversity in this type of response among the different crop plants a summary of the reports from growers indicates that a hastening of maturity of about a week is a conservative average attributable to the use of paper mulch. In some regions certain crops have matured in excess of three weeks earlier on the paper, but such differences are exceptional and related to special conditions. The earliness of about a week, however, may frequently make a substantial difference in the market value of the specialized crops.

In the production of certain bulbs and corms the use of paper mulch has shortened the period to the attainment of commercial size, while in the production of orchard crops the use of paper on small trees set into permanent planting has given every indication of reducing the number of years to commercial bearing. The effectiveness of paper mulch in hastening maturity has also been used to commercial advantage in the production of additional annual crops in short seasons and in the production of long season crops north of their former limit of satisfactory development.

Hastened devolpment and maturity is suggested as attributable principally to increased soil temperature, which is quite generally beneficial to crop-plants provided that it is not accompanied by the hastened drying out of the soil. Quite naturally the additional heat is most effective with crops of southerly origin, as melons, tomatoes, egg plant, etc., or with all crops at increased altitudes, and least effective with cool season crops in midsummer. White or light-colored papers are being tested for use in connection with the culture of cool-weather crops during hot weather. As a winter covering for the protection of

the roots of semi-hardy plants paper mulch is receiving the serious attention of growers and in some sections appears to be of economic interest for this purpose.

In a limited number of crops the use of paper mulch has attained economic significance in special ways relating to the quality of the mulched product. For example, in flower production the larger blooms and longer stems obtained with the paper have been reported as enhancing the value of the product, and in tobacco production a profit from the use of paper mulch was reported because of an increase in the number and size of the middle standards in certain types of leaf. In addition to the above-indicated uses, paper mulch has occasionally been indicated as worthy of consideration in the control of certain plant diseases, but its economic importance in this direction has not as yet been demonstrated.

On account of the fact that the agricultural use of paper mulch had its origin under tropical conditions the system has to some extent been considered particularly adaptable to the South. In general, however, the greatest progress in adapting paper mulch to the commercial culture of crops in this country has been made in the North Central States, although there appear to be occasional trials of economic promise in almost every section of the country.

From a practical standpoint the real economy of paper mulch is not based upon increased yield, hastened maturity or reduced production cost, but upon the whole operation, involving such variable factors as season, labor costs, quality of product and market prices. While the methods of experienced growers are valuable as a guide relating to the advantageous use of the method, the use of paper mulch constitutes a radical departure in cultural practices and its successful adaptation to agricultural problems can be brought about only as a result of studied application, experience and resourcefulness.

SECOND SESSION

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THE PRODUCTION OF HIGH GRADE POTATO SEED STOCKS

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The problem of obtaining pure high yielding potato seed has always been one of the most serious difficulties which has confronted potato growers. One of the chief causes for poor yielding potatoes is the presence of undesirable mixtures and diseases in the seed stock. Mixtures can usually be rogued out without much difficulty in the field as well as in the bin. In Maryland the diseases which are most responsible for low yielding seed stocks are the so-called virus diseases.

The principal virus diseases which attack the potato in this state are Leaf Roll, Spindle Tuber, Streak and several kinds of Mosaic. I will describe briefly the symptoms of these diseases. When potato plants have the Leaf Roll disease the lower leaves roll at the edges and become spoonshaped. They also become abnormally thickened and brittle. The plant is usually more or less stunted with a more upright growth than normal plants. Spindle Tuber causes the plants to become abnormally tall and spindly. It is the only one of the virus diseases which can be recognized by the appearance of the tuber, which becomes abnormally elongated and misshapen. Streak causes a blackening of the veins in the leaves of infected plants. The Mosaics cause more or less mottling of the leaves with areas of lighter green tissue. In Rugose Mosaic the leaves become crinkled and the plants are dwarfed and in Leaf Rolling Mosaic there is a rolling of the leaves similar to Leaf Roll excepting that all are affected.

The reduction in yield caused by the presence of these diseases varies according to many factors, but it is always

enough to reduce the profits of potato growing, and when prices are low it is frequently the determining factor between profit or loss. Sometimes the production of certain varieties has to be abandoned on account of the presence of these diseases. In Maryland the growth of the McCormick potato has been abandoned temporarily and perhaps permanently because all available seed stock is so severely infected with the mosaic disease that profitable yields can no longer be obtained. An attempt is being made to propagate a healthy stock of McCormick seed by tuber indexing and tuber unit-ing and a supply large enough to plant a small field is now available. These virus diseases extend throughout the entire infected plant and all tubers grown from diseased plants contain the virus and transmit it to all plants which grow from them. Thus the yield of any lot of potato seed stock is affected directly by the number of diseased tubers which it contains. Unfortunately the presence of most virus diseases excepting spindle tuber can not be detected in the tubers and the purchaser is not aware of their presence unless he knows the condition of the field in which they were grown. The virus diseases are carried from plant to plant by means of insects such as plant lice and leaf hoppers. The insects which feed on diseased plants may infect healthy plants by feeding upon them. These plants then become infected and their tubers transmit the disease the next year. If all infected plants in seed potato fields could be recognized and destroyed before insects could carry the disease these diseases could be easily controlled but unfortunately this cannot be done. Not only do the symptoms vary with varieties but they vary with different climatic and soil conditions. Furthermore some of the diseases are very difficult to recognize until the plants are so large that there has been ample time for their distribution by means of insects. Thus it is almost impossible to recognize the Leaf Roll disease in Cobbler potatoes until about the blossoming stage. Altho rogueing is a great help in the production of good seed stock it is only profitable in fields in which the percentage of

plants infected with virus diseases is small (not over ten percent) and even then it is not effective when conditions for insect transmission are unusually favorable. Even with the most careful rogueing of their seed stock many seed potato growers have found it impossible to keep down the percentage of diseased plants especially in localities favorable to insect transmission. In order to make their rogueing more effective many seed potato growers are now resorting to a plan known as tuber unit planting. The tubers are planted in units allowing a space between each unit so that all plants from one tuber can be easily detected. Some growers cut each tuber into four pieces so that there can be no mistake in identifying the units. Rogueing is then done by units. If a plant infected with Mosaic, Leaf Roll or any other virus disease is detected in any unit the entire unit or all plants which came from that tuber are pulled up and removed from the field. The practice of tuber unit-ing is increasing among seed potato growers. It is practiced quite extensively in Maine and Michigan. A number of Wisconsin seed potato growers from whom seed was obtained last year said they intended to practice it this year. In Maryland several seed potato growers planted their seed in tuber units this year for the first time. In order to produce seed stock with a still smaller percentage of diseased plants, a system of tuber indexing has arisen. The method of tuber indexing is to number every tuber and then remove and correspondingly number an eye from each tuber. This eye is planted and the remainder of the tubers are kept. Thus it is possible to plant a plot of potatoes from the remaining tubers which have grown plants in which no virus diseases could be recognized. In Maryland tuber indexing is being tried in Worcester County and with this method a small plot of McCormick potatoes with only a very limited number of diseased plants has been produced and the work will be continued with the hope of producing a source of seed sufficiently free from virus diseases to produce a profitable crop. In the north tuber indexing must be done in the greenhouse and the amount of seed

which can be produced in that way is thus limited by the amount of greenhouse space available. At the New York meeting of the American Potato Association of America in 1928, Dr. J. E. Kotila, Research Assistant in Plant Pathology of the Michigan State College of Agriculture reported on the results of tuber index work in that state. A number of tuber index strains had been released to potato growers and were reported to be practically free from diseases. Names and addresses of these growers were obtained from Dr. Kotila and approximately two hundred bushels of this seed of the Cobbler and Russett Rural varieties were brought into Maryland. The Cobbler potatoes were used for planting seed plots in Worcester, Somerset and Garrett counties, and proved to be almost free from virus diseases. Most of the Russett Rural seed was distributed among twenty 4-H club boys in Garrett County, each boy receiving enough seed to plant one-fourth of an acre. Seed for these boys' clubs was given to the boys by the Baltimore and Ohio Railroad Company. All of the boys entered their seed for certification and their fields were carefully inspected. In most plots no diseased plants were found and the only diseased plants found in any plots were one or two vines infected with Blackleg and Wilt. The yields from the fields planted from this tuber-index stock varied from 120 to 360 bushels per acre and these were larger average yields than were obtained from home grown seed. Exhibits of this seed were made at Community Fairs, at the Garrett County Fair, at the Tri-State Potato Show, at the International Livestock Exposition at Chicago and at the Maryland Crop Improvement Association exhibition here. This exhibit was one of the best potato exhibits ever made from Garrett County and won fourth place in the International Live Stock Show in Chicago.

The climate in Maryland is favorable for the production of seed potatoes if they are planted late enough so that they will mature the crop after the soil has become cool in the autumn. Excepting when grown at high elevations (1500 feet or more) seed stock should not be

planted before or about July 10. Potato growers will find it profitable and convenient to grow their own seed potatoes and in certain parts of the state seed potatoes are being profitably grown for sale. In the season of 1929, 40,488 bushels of seed potatoes were eligible for certification in Maryland and many of these were sold outside of the state at a good profit.

The following are suggestions to growers of seed potatoes:

1. Plant a seed plot to obtain seed for seed fields.

2. Secure the best seed available, preferably a tuber index strain. If this cannot be obtained use the best certified seed available, preferably seed grown by a tuber unit grower with field inspection records showing less than one percent of the plants infected with virus diseases.

3. Isolate your seed plot planting it as far as possible from other potato fields (at least 200 ft.).

4. Plant your seed plot in tuber units.

5. Begin to inspect your seed plot as soon as the plants come up and inspect it at weekly intervals until the vines die. Inspections of seed field will also be necessary but inspections need not be so frequent. However, at least three inspections of seed fields should be made.

6. When a plant infected with any virus disease is found, pull up all of the plants in that unit and carry them away from the fields. If they are thrown down in the field insects will leave them and go to the healthy plants and infect them. If tubers large enough to be used for seed have been formed they should also be removed to avoid digging them with healthy tubers. Seed fields should be rogued in the same way excepting that roguing is done with individual plants instead of tuber units.

7. All fields should be sprayed with Bordeaux Mixture 4-5-50, beginning when the plants are about four inches high and spraying four or five times at intervals of 10 days or two weeks. Add three pounds of dry arsenate of lead or one and one-half pounds of calcium arsenate to

every 50 gallons of the mixture when chewing insects are present.

When aphids are present three-fourths of one pint of nicotine sulphate should be added to 50 gallons of the Bordeaux, or the plot may be dusted with four percent nicotine dust.

8. Both seed plot and seed fields should be entered for certification so the grower can keep in touch with the latest information on seed production methods.

9. Any seed potatoes kept for planting after July 1 should be kept in cold storage after March first.

VEGETABLE INSECTS OF 1929

BY ERNEST N. CORY, College Park, Maryland

The Mexican Bean Beetle

The Mexican bean beetle for the past two years has been the outstanding insect problem of the trucker and bids fair to continue to be a major pest for many years to come. The degree of success that truckers attain in control of this pest will be directly proportional to the importance they attach to the pest, the vigilance with which they guard their plantings, and the thoroughness of their control operations.

Wherever the fields have come under our observation it has been noted that, if operations were begun promptly and when beetles first began to appear in the field, excellent control has been obtained either by dusting or spraying. Only on the lower Eastern Shore was it possible to raise very early snaps beans without applying control measures. All later crops had to be treated. In dusting operatings in Western Maryland, it was necessary to begin the dusting when the beans showed from two to six leaves. In most cases, two applications were all that were necessary.

Magnesium arsenate at 2 lbs. to 100 gallons used as a spray proved to be the most effective control. Next in order was 20-20-60 copper arsenic lime dust. At least

twenty materials were on the market and were used, though most canners adhered to the recommended materials. A late season test of these materials showed magnesium arsenate to be the best material and when combined with Bordeaux it gave superior results.

Copper added to any of the sprays improved the result. Copper arsenic lime dusts were definitely dessicating, in their effect on eggs and killed many egg mases. Materials that cannot be recommended due to injury they caused, their reduced insecticidal efficiency, or cost are as follows: Sodium fluosilicate and lime, derris preparations, epsom salts, zinc arsenate-copper-lime mixtures, calcium arsenate-sulfur-lime mixtures, dilute magnesium arsenate-lime mixtures, arsenate of lead and lime, and pyrethrum dusts and sprays (except in special circumstances). Undoubtedly pyrethrum sprays have their place in the operations of the truckers, but good judgment must be used as to the time of application. If the crop is nearly ready to pick, or, if a single picking has been made and still there appears to be considerable injury going on, the question as to whether it is advisable to use a pyrethrum spray has to be determined on the basis of the proportion of young larvae and adults in the total Mexican bean beetle population on the plants. If there is a large proportion of last stage larvae and pupae and the vines are to be plowed down before the next generation can begin effective work, the use of any application is decidedly questionable. Of course, these vines should be plowed down according to the recommendations given later. If, on the other hand, there are lots of young larvae and adults still laying eggs on a crop that is nearly ready for market or from which a single picking has been taken, then it is probable that an application of pyrethrum spray will be profitable.

Hand dusting requires 2¼ hours, four row dusters ½ hour, and four row sprayers ¾ hour per acre. These averages varied of course with the size and character of the fields and the proximity of the water, but this latter item was offset by hauling water in tanks to the fields.

The reduced time of spraying was one of the surprise elements of the campaign.

The cost of dusting varied from $1.07 to $3.71 per acre depending upon the amount of material used, size of field, and whether the owner included the cost of supervision, interest, and depreciation in arriving at his figures. Likewise spraying, calculated on the same basis, varied from $1.78 to $2.97 per acre. If we leave out the items of interest, depreciation, and supervision, the actual cost for labor and materials will run somewhere in the neighborhood of $1.78 per acre for spraying, and $1.50 for dusting.

A combination of cool nights and drought during August cut down the second generation by reducing the egg deposition. Many late plantings were not treated and satisfactory crops were harvested. Likewise most of the extra early market snap beans were not dusted or sprayed and good crops were picked, but the amount of injury developed amazingly toward the last and, if plowing had not been done promptly, all the later plantings would have been more difficult to protect.

The effectiveness of plowing with a 14″ plow has been demonstrated at the Virginia Truck Experiment Station by Chapman and Gould. Through the courtesy of Dr. Chapman, I am enabled to give you excerpts from his paper, now in the hands of the Editor of the Journal of Economic Entomology. On land disked twice and then plowed and on a similar plot with an added harrowing, no beetles were able to reach the surface, while in cases where plowing only, or plowing plus harrowing was practised, 7,046 and 9,206 beetles, respectively, emerged from the soil. Estimates based on counts gave 1,200,000 beetles as the average acre population in heavily infested fields. Plowing with an 8″ plow, without previous disking, failed to cover the plants thoroughly and an estimated average of 65,650 beetles per acre reached the soil surface.

One cannot predict just what the infestation will be next year, but it is reasonable to suppose that with the

large number of beetles going into hibernation this past fall, the bean beetle will be present in sufficient numbers to necessitate control measures next year, and, under other climatic conditions during the summer, it is probable that the late injury, so evident in 1928, will be again serious in 1930.

Miscellaneous Insect Pests

Probably the next most important insect affecting truck crops during the past season was the Southern Corn Root Worm, or, as probably better know to you the 12-spotted cucumber beetle. This insect lays its eggs in the ground around the corn plants and the larva burrows into the corn stalk just above the roots and into the crown of the plant. Such plants wilt and die frequently necessitating replanting of corn. There is no remedy that is practical for use on corn, but it is probable that the continued dusting of beans for the control of the Mexican bean beetle will result in the gradual reduction of the adults, as they feed on beans early in the season.

Two other insects were injurious to corn, the common stalk borer, which lives over in weeds, and the larger corn stalk borer, which lives over winter in the stubble. Fall plowing is generally recommended for the control of this pest, but since many are unable to plow their fields in the fall probably the only feasible method would be to disk the stubble both ways in the spring and in that way most of the larvae would probably be destroyed. The destruction of weeds, particularly the rag weeds, around the truck crops will reduce the number of stalk borers the following year. Weed destruction ought to be accomplished late in the fall or during the winter by burning as the eggs remain on the weeds throughout the winter.

Tortoise beetles were reported from a number of sections as injuring sweet potatoes. Some years ago, when Dr. Sanderson was Entomologist in Maryland, sweet potato tortoise beetles were extremely numerous and he published a bulletin, now out of print, on the pest. They are easy to control, but often overlooked until severe dam-

age has been done. Probably the use of an arsenical in a hand duster will be satisfactory as a control measure.

Japanese Beetle

The Japanese Beetle population in Baltimore City increased considerably, but there was relatively little spread beyond the city limits. Reference to the map will show that there is a spread in the Patapsco Neck section, which involves some of our best trucking land. Growers should familiarize themselves thoroughly with the quarantine regulations relative to the shipment of stock and anyone growing plants should be familiar with the methods used in certification. The thorough cooperation, which was received in the repressive measures throughout the state, has lead the Plant Quarantine and Control Administration to continue their policy with respect to quarantine and control measures and we expect all farmers to cooperate to the fullest extent in the combined efforts of the Federal and State authorities. Maryland has spent approximately $33,000 in the campaign against the Japanese beetle and every one, who has any knowledge of the work or who has been connected with it, I think feels that the money has been well spent in actual control results and in reducing the probabilities of further infestation that would undoubtedly follow the inclusion of the state in the quarantine area.

MARYLAND'S CANNING INDUSTRY

BY L. M. GOODWIN,

Extension Economist, Canning Crops,
Denton, Md.

Maryland's canning industry had its beginning in 1840 when oysters were first packed in Baltimore. During the first twenty years the development was very slow due primarily to the general lack of knowledge of even simple canning principles and the crude methods employed. The successful processing of food in cans, in the

early days, was considered to be secret knowledge and was only known to a very limited number of individuals. The processors of those days discharged their duties in a manner that suited the supreme dignity and importance of their positions and they surrounded their activities in the canning plants with no little mystery and secrecy.

Second in importance to the processors only, were the "cappers." Certain individuals had under contract practically all of the available labor skilled in capping or closing the cans. It is hardly necessary to point out that these individuals known as "cappers" exerted almost autocratic authority and importance in the industry and were responsible for many misunderstandings and labor disputes that seriously curtailed the work.

It was under such unfavorable conditions as referred to that the industry struggled for the first twenty years of its existence. Such circumstances served to stimulate rather than retard inventive genius in its effort to perfect canning machinery. The heavy demand for canned food incident to the Civil War also accellerated activity for improvement. Maryland's mild climate and abundance of products for canning as sea food, vegetables and fruits made it a desirable location for canning.

Until 1869 canning in Maryland was mostly confined to Baltimore, "the cradle of the canning industry," but at this time a Baltimore canner erected a corn cannery at Frederick. Canning rapidly spread to other counties and by 1880 Harford County alone had over fifty factories. With the development of can making machinery and improved machines for canning Baltimore became and is today an important center for the manufacture and distribution of canners' supplies. The present Baltimore Canned Food Exchange organized in 1882, has the distinction of being the oldest association of canners in the world. Maryland canners have the added distinction of having made many important contributions to the canning industry in the way of improved machinery and methods. However, we cannot live today on the glories that once were Maryland's.

In recent years canning had spread to all parts of the United States. With the general adoption of canning machinery, the development of transportation facilities and the westward movement of population, the center of the production and packing of canning crops has moved west until the present day when the middle west leads in the packing of sweet corn and peas and the Pacific coast area ranks first in the canning of fruits. It is not so much that Maryland has decreased the size of her pack but other states have increased at a more rapid rate. Maryland once the leading state in the packing of tomatoes is now challenged by California. Iowa leads in the canning of sweet corn with Maryland in third place. Wisconsin is the leading state in the packing of peas while our state, the pioneer in the packing of the commodity, is barely holding third place being exceeded by New York and in some years Utah. Maryland has, however, recently become one of the leading states in the canning of green snap beans and although no comparative statistics are available our state no doubt is one of the leaders in the canning of lima beans.

Not only is there keen competition within the industry at home as well as from foreign sources but the increased year round production and distribution of fresh vegetables presents a potential threat. At present there are no alarming indications that canned foods are to be displaced by the fresh product. The variety of canned foods packed and the general consumption are both gradually increasing. Therefore, it would seem that it is a matter of keeping abreast of the times by means of efficiently producing a good product.

The canning industry ranks high as a source of cash income to Maryland farmers. Canning crops have an annual value to the producer of approximately seven million dollars. With the exception of wheat, dairy products and possibly of poultry and eggs, it is doubtful if any other farm product has as great cash value to Maryland farmers as crops grown for canning. The total value of the industry to the State is variously estimated at thirty

to forty million dollars annually. It furnishes employment to thousands of people and it resolves itself upon all of us to keep up an active interest in maintaining for Maryland a leading position in the canning industry.

In this the farmers of Maryland have an important duty to perform. Canners cannot pack good quality products from low-grade raw material. Low grade raw material is usually the result of poor yields brought about by indifferent cultural methods. Maryland has favorable climatic and soil conditions for the production of nearly all kinds of canning crops but when we compare our per acre yields of these crops with the yields secured in the majority of the other states we find that such a comparison does not reflect credit to Maryland growers. Realization of this fact has caused progressive canners and growers to cooperate with our State Agricultural Extension Service and Experiment Station in the selection of seed, the improvement of varieties and the application of scientific cultural practices. Our most successful canners are packing a diversity of products and are in many instances finding it desirable to operate large areas of land for the production of these crops. The production of crops best suited for canning is developing into a highly specialized type of farming.

Our State Experiment Station, the Stations of other States and our Federal Department of Agriculture are constantly carrying on investigational projects that are opening up new avenues of knowledge in regard to improved methods of production. The most successful canners and farmers are those who are conscious of the value of scientific investigation and are able to apply this knowledge in an intelligent and practical manner. Efficiency of production is largely an individual matter but is unquestionably the primary step in any program for effective farm relief.

The nominating committee reported as follows:

President—W. N. EYLER, Flintstone, Md.

Vice-President—S. S. MERRIT, JR., Colgate, Md.

Secretary-Treasurer—W. R. BALLARD, College Park, Md.

Members Executive Board:

A. M. TODD, Sparrows Point, Md.
R. T. MERRIT, Colgate, Md.
ROLAND PHELPS, Brooklyn, Md.

Director for Maryland Agricultural Society, and Maryland Farm Bureau Federation:

B. I. SPARKS, 825 East 33rd Street, Baltimore, Md.

Delegate to Annual Meetings:

W. R. BALLARD, College Park, Md.

Director to Agricultural Corporation:

JAMES W. DAVIS, Rocks, Maryland.

The report of the committee was adopted.

The auditing committee reported that the Treasurer's books had been examined and the account showing a balance of $17.81 found to be in order.

The report was adopted.

The following resolutions presented by the resolution committee were adopted.

Resolved that whereas the interests of the "Crop Improvement Association" and "The Vegetable Growers Association" are synonymous that much benefit would be derived by both associations by merging; or holding joint sessions and giving members of each association opportunity to hear the speakers on both improving and growing of our crops.

Resolved that a vote of thanks be rendered to our able secretary for the fine programs selected, also to the management of the Lord Baltimore Hotel for the service and courtesies extended to us during our visit in the city.

Adjourned.

REPORT

of the

FIRST ANNUAL MEETING

Maryland Stockmen's Association

January 8 and 9, 1930

BALTIMORE, MARYLAND

The first session of the First Annual Meeting of the Maryland Stockmen's Association was called to order in the Lord Baltimore Hotel, Baltimore, Maryland, Wednesday forenoon, January 8, 1930, with the President, W. R. Harvey, of Baltimore County, in the chair. President Harvey spoke in his characteristically optimistic, helpful way as follows:

MR. HARVEY: Members of the Maryland Stockmen's Association and Friends: It is very gratifying to me and to all of us who are closely identified with the activities of this Association to have so many representative farmers and stockmen gathered here this morning. As we all know, the advisability of consolidating the Swine Growers' and Sheep Growers' Associations a year ago was quite a debatable question for us to solve just at that time, but there now seems to me to be no visible reason why it was not a good move for the best interests of stockmen in general in Maryland.

The programs for the different sessions throughout the two days that we will be here are in every way attractive, covering important questions that are continually confronting the stockmen and farmers in their everyday activities, and will be discussed by men of national reputation along these particular lines. There need be no comment concerning the dinner session to be held at the Claremont Hotel on Wednesday evening; the only matter that you need to worry about is, "Will I be able to get in the hotel and have a comfortable seat at the banquet table?"

LIBRARY, UNIVERSITY OF MARYLAND

LIBRARY, UNIVERSITY OF MARYLAND

At the dinner session, and of very great importance to those interested in the feeding of cattle, will be the talk by Mr. Paul Gerlaugh of the Ohio Experiment Station. This alone will be well worth the time spent out there, to say nothing of the great good that comes from the close contact in which we are all brought there and the better understanding in general.

Our time is always limited, and it is useless for me to encroach on time that can be taken up by the different speakers in discussing matters worthwhile, and I close by expressing my feeling of appreciation in having you here and the hope that after our meetings are over every one of you will go home feeling that you have been benefited by being with us again. I thank you.

Mr. K. A. Clark announced that Room 364 had been engaged as headquarters for the Maryland Stockmen's Association, and stated that the room would be open during the afternoon for the use of Association members.

The report of the Secretary-Treasurer was submitted, and approved, subject to the action of the Auditing Committee. The report follows:

Report of Secretary-Treasurer

The first year of the existence of the Maryland Stockmen's Association—a rather short year, as the new Association was brought into existence on February 6, 1929—has been one of fairly active growth and work. The Stockmen's Association was formed by the consolidation of the Maryland Sheep Growers' Association, the Maryland Swine Growers' Association and the Beef Cattle Conference, the latter not a very definite organization. It was believed that the single organization would be able to do all that the old organizations did and, possibly, to do these things better. Whether that thought was justified, time alone will tell.

The three sessions of the livestock meetings in January, 1929, were characterized by lively interest, good programs, active discussions, and an exhibition of a fine

desire on the part of all stockmen present to co-operate in a cordial way. Since the printed report of the 1929 meeting has been sent to members, and as some copies are still available for those who may be interested in them, no detailed review of the meeting is presented at this time.

The Annual Ram Sale was held at Centerville on July 16th, at which time 45 rams were sold for a total of $2,635, an average per head of $58.55. This sale was perhaps the best auction sale of sheep held in the state in recent years. Men who had used pure-bred rams were in the market for another ram, and many who had not been using rams of good breeding were ready to buy a good ram and to pay a fair price for it. The outcome of this sale indicates that there should be a good outlet for the products of pure-bred sheep flocks in Maryland. The complete report of the sale is on file in the office of the Secretary. The Stockmen's Association profited to the extent of $254.24, after the expenses of the sale had been cared for, and this amount has had a large part in putting the Association on a good financial basis.

During the year the Fifth Maryland Litter Contest, the object of which is to bring a litter of pigs to a weight of at least 1,500 pounds at 150 days of age, has been conducted. There were 26 entries in all—the largest number thus far entered in one of these Maryland Litter Contests. Of these 26 litters, eight were successful in reaching at least the desired weight, and we shall hear more of the results of the contest tonight. At the night meeting, the silver cup and substantial cash prizes will be awarded to the winners. In this connection it should be stated that Mr. William F. Schluderberg of the William Schluderberg-T. J. Kurdle Company, of Baltimore, has supported this contest in a generous way by offering cash prizes of $100, $75 and $50, in the State-wide Contest, and $25 for the first prize in each of the counties. The eight litter owners who brought their litters to the desired goal will receive $400 in gold at the meeting tonight.

Through the generosity of Mr. J. H. Baugher, President of the Union Stock Yards Company, Baltimore; Swift & Co., Chicago; and Swenson Brothers, Stamford, Texas, there has been established a Stockmen's Circulating Library. This library has, and now offers for the use of members of the Maryland Stockmen's Association, the following excellent volumes, which should be of real interest and value to stockmen of the state:

1. Animal Breeding, by Laurence M. Winters—A useful presentation of important facts concerning heredity and constructive breeding as applied to livestock.

2. The American Livestock Market, by Arthur M. Davenport—A thorough discussion of the organization and operation of a central livestock market.

3. A Ranchman's Recollections, by Frank S. Hastings—A readable, highly interesting recital of personal experiences and observations.

4. Beef Cattle, by R. R. Snapp—A recent comprehensive work that furnishes authentic information on beef production.

5. Feeds and Feeding, by Henry & Morrison—An authoritative book that deals with rations for horses, cattle, sheep and swine.

6. Meats and Meat Products, by W. H. Tomhave—A practical presentation of important facts about meats, butchering, curing and utilization.

7. Pork Production, by W. W. Smith—A discussion of important principles and approved practices in pork production.

8. Productive Sheep Husbandry, by W. C. Coffey—A valuable, authoritative work which has deservedly met with much favor among sheepmen of America.

9. The Yankee of the Yards, by Louis F. Swift, in collaboration with Arthur Van Vlissingen, Jr.—The biography of G. F. Swift, pioneer packer and business man.

10. Types and Breeds of Farm Animals, by C. S. Plumb—A "best seller" that deals authoritatively with description and history of the different types and breeds.

11. Types and Market Classes, by H. W. Vaughan—An interesting and exceptionally well-written book that deals with types and market classes of livestock.

The membership of the Association in 1929 reached 109, which is very encouraging for the first year. It is hoped, however, that this number will become much larger during 1930 and successive years, for there is much to be done that may be most effectively accomplished through a strong livestock organization.

Throughout the year the Monthly News Letter was sent to members, and such expressions concerning it as have come to the officers indicate that it is serving a useful purpose. If this activity is continued, it is suggested that each member take an active part in furnishing items of interest that may be published for the benefit of the industry. Maryland stockmen need to become better acquainted with each other and with the work that is being done to improve the livestock business in the state.

The financial statement covering the year's activities is presented in the following summary:

FINANCIAL STATEMENT

RECEIPTS

Membership dues:		
109 members 1929	$ 109.00	
1 member 1930	1.00	
1 member 1930, 31, 32, 33	4.00	
Contribution to Library Fund, J. H. Baugher	25.00	
Net receipts from Ram Sale at Centerville	254.24	
Voluntary fee for sale of rams at Ram Sale:		
James Davidson, Bel Air Farms	10.50	
Balance from Sheep Growers' Association	22.00	
Balance from Sheep Fund, Missouri and Montana transactions	10.11	
Balance from Swine Growers' Association	14.53	
Total Receipts		$ 450.38

EXPENDITURES

Printing, stamps, postal cards	$ 7.50	
Henry, Morrison Co.—Book	3.00	
Hay Rubber Stamp Co.	1.35	
Univ. of Maryland Press—Printing and stationery	17.50	
Black & Gold Shop—Books	14.23	
M. M. Stewart, Secretary—Annual dues	20.00	
Student's Supply Store—Book	.85	
Pearson & Crain—Engraving cup	1.50	
Univ. of Maryland Press—Printing and stationery	4.50	
Univ. of Maryland Press—Printing and stationery	9.00	
Leroy K. Murril Co., Baltimore, Md.—Stencils	5.83	
Pearson & Crain—Engraving and mailing two cups	2.00	
Hyatt Manufacturing Co.—Badges	22.00	
DeLuxe Sign Co.—Signs	7.65	
Maryland Farm Bureau Federation—Medals	15.00	
Black & Gold Shop—Books	4.87	
Total Expenditures		136.78
Balance		$ 313.60

Respectfully submitted,

B. E. CARMICHAEL,
Secretary-Treasurer.

Mr. K. A. Clark reported the Annual Ram Sale held by the Association at Centerville and the purchase of two carloads of ewes in Montana for Maryland breeders. His report is as follows:

REPORT OF RAM SALE AND EWE PURCHASE

BY K. A. CLARK
College Park, Maryland

The first ram auction ever held in Maryland was held at College Park on May 29, 1926. This sale was staged to supply commercial lamb raisers with a desirable class of rams at their own prices. Pure-bred rams had been distributed prior to this time in various ways, but the auction was adopted on this occasion as the type of sale having the most desirable features connected with it. Three ram sales in all were held at College Park, in successive years. While this was going on, ram sales were started in Centerville, the first one being held in 1927. This sale was held in July, as have been all following Cen-

terville sales. It is recognized, I believe, among our sheepmen that it is no longer possible to meet early lamb market requirements with lambs of common or indiscriminate breeding. The conformation and breeding of the individuals that make up the flock has much to do with the market value of the lambs produced. It was to improve the general character of Maryland sheep and to make our lambs more suitable for market, especially the early market, that we have always encouraged our breeders to buy better rams. During the four years since 1926 the ram auctions have become established institutions, and at the present time it can be said they are fulfilling the purpose for which they were started.

The sale not only offers the opportunity for buyers to make their own selections; it is equally as important as a market for the producer of high class registered rams. We should ultimately produce as many pure-bred rams in Maryland as we use, and we should also buy the pure-bred rams we are using from Maryland breeders. The ram sale is an institution that should be developed more and more until this goal, among others, is reached.

Our grade flock owners are becoming more particular in the kind of rams they wish to buy. To offset this, our pure-bred breeders are raising better rams than they did a few years back. The ram sales have therefore probably been a decided stimulus to the improvement of our sheep flocks, both grade and pure-bred. There is no limit to which this development may progress, the farther it goes the better.

In the beginning, College Park was selected as the place to hold the Annual Ram Sales for the reason that they could be held in connection with Farmers' Day, when there was a large number of sheepmen visiting the college. The Farmers' Day sales at the university, however, were too early in the season. Buyers do not wish to make their purchases until late in the summer, when ready to start breeding. After the first College Park Ram Sale, our success was none too great, and the third sale, held in 1928, was the last held at the university.

We had held a sale at Centerville in 1927 which was very successful, as have been all held there since. Centerville is located in a territory where the sheep population is dense. There are between 30,000 and 40,00 breeding ewes within a radius of 35 miles of Centerville. Our Centerville sales have been so popular and the enthusiasm has run so high that it seems we have found the right location for our annual sales.

Our 1929 sale was the best sale ever held in this state. The following is a complete report of it:

Report of Third Annual Ram Sale, Centerville, Maryland, July 16, 1929

Consignors: (Letters in Sale Report Column Headed "LOT" refer to Consignor).

(A.) Belair Farms, Bowie, Md.
(B.) Wm. J. Hines, Brighton, Md.
(C.) M. C. Sherman, Queenstown, Md.
(D.) E. F. & H. H. Hockman, Strasburg, Va.
(E.) E. P. Cockney, Stevensville, Md.
(F.) H. P. Miller, Grantsville, Md.
(G.) R. C. F. Weagly, Hagerstown, Md.
(H.) St. Amour Co., Coatsville, Pa.

Lot	Breed	Age	Buyer	Address	Price
1A	Hampshire	1	E. L. Kratz	Greenwood, Del.	$ 40.00
2A	Hampshire	1	H. S. Startt	Chestertown, Md.	45.00
3A	Hampshire	1	G. B. Fenwick	Glyndon, Md.	85.00
4A	Hampshire	1	Isla Corporation	Easton, Md.	49.00
5E	Hampshire	3	Brooks Mapp	Keller, Va.	70.00
6B	Hampshire	2	Isla Corporation	Easton, Md.	70.00
7B	Hampshire	1	E. F. & H. H. Hockman	Strasburg, Va.	69.00
8B	Hampshire	1	G. B. Fenwick	Glyndon, Md.	75.00
9F	Hampshire	1	Leonard Snider	La Plata, Md.	60.00
10F	Hampshire	1	H. S. Startt	Chestertown, Md.	67.00
11F	Hampshire	1	Isla Corporation	Easton, Md.	40.00
12F	Hampshire	1	James F. Hall	Church Hill, Md.	50.00
13F	Hampshire	1	Randolph Leigh	Washington, D. C.	64.00
14F	Hampshire	1	H. S. Startt	Chestertown, Md.	70.00
15F	Hampshire	1	John Meagher	Baltimore, Md.	75.00
16F	Shropshire	1	Isla Corporation	Easton, Md.	39.00
17F	Shropshire	1	W. H. Woodall	Galena, Md.	57.00
18F	Shropshire	1	Isla Corporation	Easton, Md.	40.00
19F	Shropshire	1	James E. Phillips	Golden Hill, Md.	42.00
20C	Shropshire	1	J. P. Cochran	Warwick, Md.	31.00
21C	Shropshire	1	M. D. Way	Centerville, Md.	50.00

Lot	Breed	Age	Buyer	Address	Price
22C	Shropshire	1	J. P. Cochran	Warwick, Md.	44.00
23C	Shropshire	1	Isla Corporation	Easton, Md.	48.00
24C	Shropshire	1	J. P. Cochran	Warwick, Md.	56.00
25C	Shropshire	2	J. P. Cochran	Warwick, Md.	62.00
26G	Hampshire	1	Isla Corporation	Easton, Md.	50.00
27D	Hampshire	1	Henry Slaughter	Longwoods, Md.	50.00
28D	Hampshire	1	W. D. Tilghman	Easton, Md.	60.00
29D	Hampshire	1	H. S. Startt	Chestertown, Md.	71.00
30D	Hampshire	1	Morton Stelle	St. Michaels, Md.	60.00
31D	Hampshire	1	Isla Corporation	Easton, Md.	50.00
32D	Hampshire	1	J. M. Barwick	Easton, Md.	48.00
33D	Hampshire	1	Morton Stelle	St. Michaels	62.00
34D	Hampshire	1	Isla Corporation	Easton, Md.	50.00
35D	Hampshire	1	E. P. Cockey	Stevensville, Md.	66.00
36D	Hampshire	1	Caroline County Farm	Denton, Md.	41.00
37D	Hampshire	1	Isla Corporation	Easton, Md.	57.00
38D	Hampshire	1	J. Kemp Bartlett	Easton, Md.	68.00
39D	Hampshire	1	Isla Corporation	Easton, Md.	47.00
40D	Hampshire	1	James E. Phillips	Golden Hill, Md.	62.00
41D	Hampshire	1	H. S. Startt	Chestertown, Md.	53.00
42D	Hampshire	1	R. F. Powell	Berlin, Md.	73.00
43D	Hampshire	1	Isla Corporation	Easton, Md.	53.00
44H	Hampshire	1	J. S. Stevenson, Jr.	Waynesboro, Pa.	75.00
45H	Hampshire	1	J. F. Hall	Church Hill, Md.	131.00
					$2635.00

Total Sale Price, 45 rams

It will be noted that the 45 registered Hampshire and Shropshire rams sold for a total of $2,635, an average of $58.55 per head. The highest price paid was $131 and the lowest $31. Sheepmen gathered in large numbers to attend the sale. There were probably 400 people present. Everyone seemed to appreciate the quality of the rams offered. The general comment was that they were the best lot of rams ever offered at any of our annual sales. Rams sold in the previous sales had apparently given good service, for the sale was a positive, snappy, going affair from the start. The sheepmen present wanted rams, and were willing to pay for them. One ram went to Delaware, one to Pennsylvania, three to Virginia, and the others stayed in Maryland. The Maryland counties represented in the list of purchasers were Kent, Baltimore, Talbot, Charles, Queen Annes, Dorchester, Cecil, Caroline and Wicomico. This indicates a fairly wide distribution of the rams.

Never have I seen an auction of any kind where interest and enthusiasm were at such a high pitch as at Centerville last July. Colonel Humphrey D. Wolfe, who has always sold our rams, was in prime fettle. It was a clear, warm, dry day. Wheat harvest was going on at a great pace, but a large and interested crowd began to gather as early as nine o'clock in the morning, and by sale time there were around 400 people in Centerville to take part in the sale one way or another. Everything went off without a hitch. Practically all of the rams had been at Bennetts Point Farm for a couple of weeks before the sale. Here we had gone over them and put them in presentable shape for the sale ring. The rams were in good condition and looked well. The above report and paragraphs tell the results we obtained.

The following summary is a condensed report of all the sales held:

College Park Ram Sales

	1926		1927		1928	
	Number Sold	Average	Number Sold	Average	Number Sold	Average
Hampshire Yearlings	20	$44.15	10	$30.10	10	$36.90
Shropshire Yearlings	4	34.00			5	27.00
Aged Hampshires	2	31.00	2	20.00		
Shropshire Ewes					9	25.33
Hampshire Ewes					10	34.00

Centreville Ram Sales

	1927		1928		1929	
	Number Sold	Average	Number Sold	Average	Number Sold	Average
Hampshire Yearlings	14	$36.64	*9	*30.00	35	$61.60
Shropshire Yearlings	13	40.38	16	40.81	10	47.90

* Included 4 lambs averaging $24.25

All Sales

	Number Sold	Average
Hampshire Rams	102	$45.03
Shropshire Rams	48	40.16
All Rams	150	43.48

It will be seen from the tables that our ram sales over a period of years have resulted in fairly good averages. No high averages have been made in any one of the six sales except in 1929. One sale with a low average was held in College Park in 1927. I will say in this connection, however, that the rams in this sale sold plenty high when their quality is considered. When the rams are right they will sell. Each year there is a consistent demand for the right quality of rams. More can be sold some years than others, but at Centerville we will eventually be able to sell 50 or more rams without any trouble.

Referring to the things the buyer is looking for in a ram, it occurs to me that our pure-bred dealers must get more size on their yearlings. I am not speaking of height, I am speaking of weight. A yearling ram should weigh at least 165 pounds before he goes into the sale. Buyers are looking for more size and weight. Rams with extra heavy bone seem to be in greatest demand. This is probably due to the fact that most sheepmen are trying to increase the size of their ewes. They want them to carry more bone. They are after better constitutions in their sheep. Whether the heavy-boned ram is best for them or whether sheep of extra large size are of any advantage is beside the point. They want heavy-boned, husky rams. In conformation the buyers like meaty rams with thick bodies, wide, heavy loins and plump quarters. Occasionally a ram that is up in the air will suit a buyer, but generally they want them "made in one piece" and close to the ground.

Rams with unmistakable breed traits and characteristics will out-sell those that possess the fine points to a less extent. For commercial purposes, the conformation and body character of the ram are of prime importance, but buyers are paying considerable attention also to the wool on the nose and face, the color and set of the ears, and other finer points. Only by using good foundation flocks and keeping up with this demand can our pure-bred breeders continue to please buyers with their rams.

It is useless to talk about selling a ram that is thin in

flesh. The buyers like to see them carrying plenty of fat and will pay more for them in that condition. A thin ram does not show himself off to the same good advantage as one that is in fine condition for sale. The sooner our breeders recognize the fact that rams should be put into the sale ring in good condition, the more certain they will be of successful sales. The fleshy rams catch the eye of the buyer. They also have the strength and reserve vigor to go out and do a good job in a breeding flock.

The outward appearance of the ram is almost entirely determined by the length, character and trim on his fleece. While buyers do discount the refinement shown by the blocked fleece, they like to see it. A ram that is put in the barn and kept out of the rain and sunshine for six or seven weeks and has his fleece nicely blocked out before entering the sale ring cannot help but make a better impression on everyone than a ram right out of the field. I am not arguing for mere appearance or higher prices; I only want to see the rams go into the sale ring looking like respectable sheep. A pair of shears, a wool card and a few hours' time will improve the appearance of the fleece a great deal. This finish should not be overlooked by the buyer or the seller.

This year we handled 45 rams through the Centerville sale. We will not require so many in 1930, perhaps, but eventually we should be able to dispose of 50 rams at Centerville without any trouble at all.

The 1929 sale was advertised more extensively than previous sales. Sale announcements were printed in the Easton, Centerville and Chestertown papers. This cost $10.50, and was perhaps the best money spent in the promotion of the sale. I believe more advertising of this type will be profitable.

The question has been asked as to whether we could successfully hold more than one sale in Maryland. As I look over the territory, it occurs to me that the Eastern Shore, Southern Maryland and Western Maryland are

three distinct areas where good sales might be held. The number of rams that could be sold either in Western Maryland or in Southern Maryland would be so small that it would probably not pay to hold sales in these sections. Furthermore, these sections have a number of pure-bred flocks. Buyers can usually go to these pure-bred flocks and make their own purchases at private treaty in a satisfactory manner. The same is not true of the Eastern Shore. There are practically no pure-bred flocks in that section where sheepmen can go to buy rams, and yet there are hundreds of grade flocks wanting them. If sales were to be held in other parts of Maryland, a sale at Waldorf would serve the buyers of Southern Maryland. A sale held at Middletown or Boonsboro would probably serve Western Maryland. Ram sales should be held in small towns. For a ram sale, it is better to be a big event once a year in a small town than a small event in a big town. Oakland is another town in Western Maryland where a ram sale might be held. There is no place, however, in Maryland that has possibilities for a more successful sale than Centerville. Since we do not have the time and other facilities to expand too extensively, I believe it is best, for the present, at least, to concentrate all our efforts on the Centerville sale and make that our Maryland Ram Sale.

Ram sales should witness a good development in this state during the next few years. From 1,000 to 2,000 rams are required annually to breed our flocks. A small percentage of these rams at present are pure-breds. With such a big potential field to work on, it hardly seems likely that a surplus of good pure-bred rams could possibly exist for several years. Pure-bred breeders need to do more advertising. They must also put their rams through the sales in the best possible condition. Unless this is done, buyers will become less and less satisfied with the rams offered and the support for the sale will be hurt. I have confidence in our pure-bred breeders to prevent any such condition. They are in the business to improve it and push it. They will put it over, and Mary-

land will eventually take her place among sheep states as a result of their efforts.

I have been asked to make a report on the pure-bred ewe purchase made in Montana in August. Professor Hunt and myself left here August 3rd for Anaconda, Montana, to visit the Mt. Haggin Ranch Company. This Company had priced us a bunch of yearling ewes at $30 per head and a bunch of older ewes at $20 per head.

Upon our arrival and inspection of this great flock of sheep, we were greatly impressed with the uniform type and quality of the sheep. We purchased there and shipped back to Maryland for breeders here 279 ewes and 5 rams. The following table shows the distribution of these sheep:

Name, Address and Number of Sheep Purchased by Each Cooperator from Montana

Name	Address	County	No. ewes obtained	No. rams obtained
R. C. F. Weagly	Hagerstown	Washington	7	
Dr. C. H. Conley	Frederick	Frederick	15	
Wm. J. Hines	Brighton	Montgomery	11	1
Leonard Snider	La Plata	Charles	18	
John Meagher	Baltimore	Baltimore	50	
John Chambers	Centerville	Queen Anne	25	1
L. L. Gadd	Centerville	Queen Anne	10	1
James F. Hall	Church Hill	Queen Anne	10	
Isla Corporation	Easton	Talbot	34	
J. Kemp Bartlett	Easton	Talbot	12	
Stanley Cox	Oxford	Talbot	8	
L. F. Anderson	Easton	Talbot	20	1
Charles Everhart	Frederick	Frederick	2	
W. B. Allnutt	Baltimore	Montgomery	15	
Emory Lease	Frederick	Frederick	4	
B. F. Saul	Chevy Chase	Montgomery	6	
Univ. of Md.	College Park	Prince Georges		1
State Sanatorium	State Sanatorium	Frederick	29	

The total cost of these sheep, including the freight and other expenses in getting them here, was $7,915.36. These ewes were a select lot and should be the means of much improvement in the sheep flocks of this state.

To visit Dr. Gardiner and his establishment is to be convinced that he has one of the greatest Hampshire flocks in the world. He follows a definite system of breeding and keeps most accurate records. His system of lambing out his ewes is excellent. Each ewe lambs in a private pen, and the lamb is ear-tagged and entered in his records before it leaves this pen. The ewe and her lamb are left in the small pen about 48 hours. They are then removed to larger pens, which accommodate about eight or ten ewes and their lambs. Here they are left for a week. They are then put out in the open sheds in big bunches.

The system of selecting stud rams is based on performance. Each year the crop of ram lambs is gone over and carefully culled. The select rams from the crop are given a mark which he calls the "red dot." After this has been done and the ear-tag numbers of the "red dot" rams taken, their breeding is looked up and each sire in the flock is credited with the "red dot" rams he has produced. This gives quite a definite value to every stud ram, and is the means used in selecting them.

Maryland breeders of pure-bred sheep are encouraged to fix in their minds the definite type of rams desired by commercial producers. By buying stud rams in conformity to this type and by culling ewe flocks very carefully, it will be possible within a few years to improve our pure-bred flocks and to raise them up to a very high standard of excellence. One means suggested to attain this end would be for a number of breeders to select a bunch of rams of similar breeding from one flock and exchange them among each other. The use of these rams would establish a uniformity in our flocks that could not be obtained otherwise. It would make all such flocks like one big flock. This principle, applied to both Hamp-

shires and Shropshires or any other breeds, would work wonders on our pure-bred flocks.

The sheep industry in Maryland was never in better shape than at present. While the market during the coming season may be different than we have had, one fact will continue to be true forever—blood will tell. In times of market dullness or distress, good sheep will still be more profitable than scrubs.

MR. G. B. FENWICK, Baltimore County: What are the plans for a 1930 Ram Sale?

MR. CLARK: It is expected that a ram sale will be held at Centerville during the coming summer. Perhaps 20 to 25 rams will be wanted for the sale. Originally it had been planned to have about this number for the 1929 sale, but the demand developed in a way that called for a much larger number, and all that were offered were sold readily. Mr. Grubb, County Agent, of Queen Annes County, has suggested that the sale be held at a little later date in July, when fewer farmers would be so busy with their wheat that they could not conveniently attend. It is possible that some pure-bred ewes will be offered at the 1930 ram sale, as a number of farmers have indicated that they would like to buy some. Also, it is possible that a ram sale will be held at some other point in the state, perhaps at Frederick, so that farmers in that locality may more conveniently purchase their rams.

MR. HARVEY: It was my privilege to attend the 1930 Ram Sale at Centerville, and I thought it was the "snappiest" sale that I ever witnessed. I had scarcely "hit the ground" (having made the trip with Senator Wolfe) before half a dozen men asked me to pick out rams. I told them that I would not undertake to select the best ram in the sale, but that I would show them the ten rams that were, in my judgment, the best ten rams. I bid on several rams, and went to $100 in one case, but did not succeed in buying a ram. As Mr. Clark has stated, rams offered at the auction should be in a little better condition than some in the 1929 sale. It will not pay to offer sheep that are in poor condition, for buyers

want something that is superior to what they have at home. I agree that some ewes might well be included in the 1930 sale. The 1929 sale was a real success, and I hope that the one in 1930 will be as good, with all animals in better condition than some that were offered last year.

Mr. Paul Gerlaugh, Chief in Animal Industry, Ohio Experiment Station, Wooster, Ohio, was next introduced. His address, which held the close attention of his hearers, is as follows:

LIVESTOCK FEEDING

BY PAUL GERLAUGH

Ohio Experiment Station

It is a pleasure to come to Maryland to discuss some livestock problems with you. This morning we have been assigned the subject of livestock feeding. This subject is always appropriate, because it contains sufficient breadth to permit discussion from dozens of angles.

I would hesitate to telephone to a clothing store and ask them to send me a suit of clothes without their knowing something of my requirements in size and cloth preference. The suit probably would not fit. The same with rations.

I know very little about many of your livestock problems. Your feed situation is different than I am accustomed to; your market requirements vary from ours. In fact, a ration that might fit well on an Ohio farm might cause numerous smiles if a Maryland farmer would try using it without alterations. However, there are many problems in livestock feeding that are similar the country over. Some of these general problems will be discussed for a short time and then specific reference will be made to sheep.

Livestock is kept on our farms with the expectation that a greater financial return will be obtained by marketing our crops in some form of livestock product. The

arguments of soil fertility and year-around employment are items that lead to the same end.

We are fortunate in having a diversity of opinion as to which class of livestock is preferable. We need keep a class of livestock that adapts itself to our farms. Dairying adapts itself to much more intensive farm conditions than does beef cattle production or fattening. A dairy cow will usually turn twice as many dollars in a year's time as a beef cow. If a farm will accommodate only a dozen cows I think a man would make a mistake if he kept beef cows instead of dairy cows. On the other hand, some of these farms that keep thirty or forty cows might be paying more returns if their feeds went into beef rather than milk. Hogs have quite different feed requirements, but seldom adapt themselves as the only class of livestock to be raised on a farm. The pasture and roughage don't market best through hogs.

Good blood is worthwhile in livestock. How good a sire is a man justified in buying who raises his own livestock? That point is not so easy to answer. The man with a few females cannot afford the same investment in a bull that he could with a large number of females. I don't know of any better rule to go by than to use as good a sire as you can reasonably afford.

For the man who buys his feeder animals the question of how much quality is equally debatable. The better grades invariably turn feed into product more efficiently, and command a higher market price when fattened, but those two factors, important as they are, do not guarantee profit. The season of marketing, the market where the livestock sells, and the relative cost are very important factors to be considered in determining which grade of feeders to buy. In purchasing feeder animals look ahead to the probable demand at time of selling rather than the demand at time of buying.

We sometimes see or hear statements to the effect that the animal that tops the market is most profitable. Remember that many factors, other than selling price, determine profits. Take, for instance, the hog market.

Light hogs usually sell for more per cwt. than heavy ones. They should, so far as the hog feeder is concerned. Let us say that it requires $36 a year to feed a brood sow that raises two litters of six each to weaning. That is $3 per pig at weaning time. If that pig is sold at 150 pounds you have $2 per cwt. in overhead covering the sow. If you sell the pig at 250 pounds that overhead item lowers itself to $1.20 per cwt. I am aware of the fact that it requires more feed to put gains on the pig as he gets heavier, but it is seldom that a medium-weight pig will not turn feed into gains at a profit. I don't want to infer that all farmers should feed their hogs to a heavy weight, but I do want you to realize that the market grade that commands the high dollar is not necessarily the most profitable grade for the farmer to produce and sell.

I have been asked to say something about sheep feeding. Many of the sheepmen of the state may be interested in the results of a five-year test which the Ohio Experiment Station conducted at its Southeastern Test Farm, with Mr. Bell in charge.

Four lots of thirty Merino ewes were handled on different planes of nutrition for a period of five years. One lot received a half pound of grain per ewe before lambing and up to 1½ pounds of grain per ewe after lambing. This was considered a system of liberal feeding. One lot was given no grain prior to lambing on pasture in April or May, and no grain following lambing. Two flocks were maintained on levels between the extremes mentioned. There was no question at the end of the five years but that the feed fed to the ewes was an excellent investment in prolonging the period of usefulness of the breeding ewe; in the wool production of the ewe; in the number of lambs born, and the gaining ability of the lambs when being fattened for market. The results of this test certainly indicated that good care of the breeding flock was surprisingly well worthwhile. Those who are interested in more details of this test are welcome to a descriptive circular if you will but give us your name

and address. Mr. Bell has conducted other tests that you may be interested in.

Minerals were not a worthwhile addition to a ration containing legume hays for pregnant and nursing ewes. It is realized that legume hays run high in minerals, and it is not known whether the minerals could be profitably added to rations that do not contain legume hays. The control of goiter in lambs can probably be obtained by feeding minerals containing iodine to the pregnant ewe.

Lamb feeding tests indicate that native mutton lambs, if treated for stomachworms, would make as efficient use of feed as western lambs. Fine-wool lambs required more feed per hundred pounds of gain, produced more wool, but sold for less on the market after shearing than did the mutton type lambs. The relative initial cost of the lambs is the determining factor in the profitableness of the three types of feeding lambs.

Doubtless Maryland flocks are not immune from stomachworm troubles. Last summer four bunches of lambs were all pastured on an infested pasture. Lot 1 received no treatment for stomachworms and no grain. Lot 2 was treated for stomachworms, but received no grain. Lot 3 was not treated, but was fed .85 of a pound of grain daily, while Lot 4 was treated with copper sulphate monthly and received .85 of a pound of grain daily. It paid very well to treat the lot of lambs that received nothing but pasture. It paid twice as well to feed grain to Lot 3 as it did to treat Lot 2 with copper sulphate. Lot 4, that received the treatment for stomachworms and was also fed the grain, returned more profit than the other three lots put together. The so-called corn crib cross is still a good one in livestock feeding.

Detailed reports of the work which I have told you about are available by writing to the Ohio Station, or if you will give me your name I will see that such reports as you want are forwarded to you. (Applause.)

PRESIDENT HARVEY: I am sure that we all have profited by Mr. Gerlaugh's talk. It is a mistake to keep more of livestock than can be well cared for. Average Mary-

land feeders can do much to increase the net returns from their herds and flocks if they will keep the kind of livestock which best suits their conditions and then feed and market their stock in accordance with the best practice of successful stockmen.

President Harvey next introduced Mr. D. A. Spencer, in charge of Sheep and Wool investigation, U. S. Department of Agriculture, Washington, D. C., who spoke as follows:

WOOL AND PROFITS

BY D. A. SPENCER

U. S. Department of Agriculture

Fellow stockmen, it is with real interest and a feeling of opportunity that I take part in the discussions of your meeting today. "Sheep Acres," a part of the Government Farm at Beltsville, Maryland, is one of the proving stations for sheep raising in which I am not only officially but personally interested, and this gives me contact with Maryland conditions and Maryland people. While "Sheep Acres" is a national farm, I would assure you that we do not lose sight of the fact that it also has responsibilities to the community and state in which it is located.

Your program committee has assigned me the topic, "Wool and Profits," so that I naturally take for granted that you are expecting this discussion to include not merely a technical consideration of wool problems, but something about your everyday problems in the growing of wool and ways and means of getting the greatest possible profits out of it.

Less than a century has passed since wool was the primary reason for the existence of the sheep industry, but gradually the changing economic conditions of the country have changed the objectives of sheep raisers until today the financial returns from the average American flock of sheep is more for the meat than for the wool. Nevertheless, wool is important as a source of profit, and

if we would conduct the sheep enterprise on a safe and efficient basis we should not neglect the fleeces of our sheep.

Average fleece weight for American sheep has quadrupled during the last century, and there is still opportunity to raise the average. George Washington raised good sheep for his time, and he improved them and their fleeces greatly when he was able to give them personal attention, but during the time he was president and had to leave the care of his sheep to others their fleece weights were tremendously reduced and they deteriorated in quality. From his experience it may be well for us to take a lesson. We should not rest too contentedly on the fact that fleece weights have increased so greatly since 1830. A little neglect would soon turn our progress around in the opposite direction.

The average fleece weight for the sheep of Maryland in 1928 was 6.1 pounds, while the average for the United States was 7.8 pounds. If we figure wool at the moderate price of 35 cents a pound, this works out to tell the fact that the average sheep raiser of Maryland is getting about 60 cents less per sheep for his wool than the average sheepman of the United States. This may not seem like a large amount, but in this era of high costs it may at times mean the difference between profit and loss, and it is really worth saving.

I am well aware of your interest in lamb production, and in this discussion of wool I have no intention of minimizing the importance of that phase of sheep raising. I am convinced, however, that we can get good fleece weights along with the best of our lamb crops, and the results of our experiments on this subject show that there is substantially more profit from the combined sales of the wool and lambs of the heaviest shearing ewes than there is from the light shearing ewes. Our studies of ewes typical of those that prevail in Maryland and under conditions that apply to the sheep producing territory of this state bear out this claim. I recall cases where this has meant from $1.50 to $2.00 more profit per ewe

for the heavy shearing ewes and without sacrifice in the quality of the lambs.

Of all the pure-bred sheep in the State of Maryland that were enumerated by breeds in the 1920 census, slightly more than 99 per cent of them were of the mutton breeds. The Down breeds, that is, Southdowns, Shropshires, Hampshires and Oxfords, made up nearly 88 per cent, and Dorsets a trifle over 10 per cent. It therefore seems safe to conclude that wool production in Maryland must come nearly altogether from sheep of the medium wool, mutton breeds.

Some of the medium wool sheep have a tendency to produce fleeces that contain black or gray fibers, but our studies of such sheep at Beltsville have shown the possibility of producing a large percentage of fleeces that are free from this objection. Proper selection of the breeding ewes and rams is the secret to success in the elimination of this from flocks. For wool that is sold on merit it pays to breed the dark fiber fleeces out of our sheep and to pack such fleeces separately at shearing time.

Investigations of the Federal Bureau of Animal Industry show that as a rule the increase of length of staple of fleeces is strongly associated with increased weight per fleece. Length of staple is so easy to estimate or measure that we can readily use it as a helpful guide in selecting breeding ewes and rams in our efforts to breed for heavy fleece weights. Of course, in selecting for length of staple we should watch carefully to select also for fleeces that are at least fairly dense or compact and avoid loose, open fleeces. Fleeces that are bright, lustrous and distinct in crimp are also good to pick for, as they add to the attractiveness and quality of the wool.

The influence of feed on the strength and value of the wool should not be overlooked if you want to keep the interest of good, honest wool buyers that will pay what wool is worth. Periods of starvation weaken the fiber and reduce its value for manufacture. Sheep that are fed the right kind of feed or pasture in sufficient quan-

tities and regularly so that they at all times keep in a thrifty condition are most likely to produce strong, lofty fleeces.

Shearing the fleeces on a clean, dry floor is an essential with which all experienced sheepmen are familiar. When the fleece is rolled up it will help to keep it in good appearance if you will spread it out, skin side down, turn the sides in and roll it from the breech end to the neck and tie it with paper fleece twine. In this way the clean side of the fleece will be on the outside when it is tied up.

No doubt most of you have found it a good practice to store your wool in good clean wool bags rather than to put it in a bin in the granary or some other place in the barn where it will get dusty or littered with chaff.

Those who are interested in the technique of sheep shearing and tieing fleeces and in various qualities in wool are invited to inspect the exhibits of sheep shearing photographs and wool samples. (Applause.)

Better Lamb Production and Marketing Round Table

PRESIDENT HARVEY: We will ask Senator Wolfe, our Association Vice-President, to open the round table discussion on Better Lamb Production and Marketing, from the standpoint of the producer of commercial lambs.

MR. WOLFE: Mr. Chairman and Gentlemen: I have raised a few sheep ever since I began farming. I keep pure-bred sires and have some very good grade ewes. My preference is for the Hampshire sheep; I like the black-face sheep with but little wool on the face. I formerly had Shropshires, and did away with them because I do not like the woolly face of the Shropshire. One cold winter I had to cut the wool from around the eyes of the sheep so they could see.

I usually raise some fairly good lambs. I sold about 60 head a few weeks ago to Mr. Plitt, the largest individual butcher in Baltimore City. I could have sold them before

grass was gone, but the market did not suit me, so I fed them a little while. I sold them at 14 cents per pound, and I think they were fairly good.

I always dock and castrate my lambs. I do not put my sheep up at night, but I have shelter provided for them to use if they want it. When bad weather comes they go in of their own accord. The ewes are fed oats and bran with good clover hay when I have it; sometimes alfalfa is used. Cold rain is very injurious to sheep; with the shelter I have provided they come up at night themselves.

PRESIDENT HARVEY: Mr. Harry Baugher, of E. A. Blackshere & Co., Union Stock Yards, Baltimore, will now discuss the subject from the standpoint of the commission man at the Yards.

MR. HARRY BAUGHER: Mr. Chairman and Gentlemen: This discussion has interested me. The most important things in the marketing of lambs have already been talked about. If the producer has good quality stuff and has notified his commission man, it is pretty likely sold before it gets to the market. If the stuff isn't of good quality it is up to us salesmen to try to make buyers believe it is as good as it is and to get the best possible price. It is important to have good rams and ewes at the start. A man who brings good quality livestock to market will have eight or ten buyers looking for it. They all want the best, and if they don't get it, some are displeased because one gets better than the other.

You can always tell good market material by looking at it. I believe that docking and castrating are very important, as has been said before. It is a very important thing when anyone is sending stock to market to call and let us know what is coming. If we know just what is coming we can better arrange to sell it. There are some who want medium lambs and some who use cull lambs. Of course, the easiest lambs to sell are the good ones, for they practically sell themselves. Just inform us about the quality, the weight, and anything else you can tell us about them. The lamb market has been bad this

year, and about the only kind of lambs that we can sell satisfactorily are the good ones.

Question—What is the most desirable weight at which to market lambs?

MR. BAUGHER: The most desirable weight now is from 75 to 80 pounds.

MR. STOTELMYER, Washington County: Would lambs weighing 110 to 120 pounds bring less per pound?

MR. BAUGHER: Yes, although that would depend on the supply at market. Most of our heavy lambs come in at this time of the year. Many of the heavy lambs will not show the lamb "break-joint," and this means that the buyer of dressed lambs refuses to purchase for lambs the carcasses from lambs that are as heavy as yearlings and show maturity instead of the "break-joint."

It has been a pleasure to meet you gentlemen, and we assure you that commission men want to serve producers in every possible proper way. Produce lambs of good breeding, weight and finish; dock and castrate regularly; and notify your commission man when you are planning to market the lambs, so that he can serve you to the best of his ability.

PRESIDENT HARVEY: Mr. E. Wilbur Plitt, of Baltimore, who does an extensive business in slaughtering and selling lambs, is with us, and will present the views of a man who buys lambs for slaughter and sells dressed lamb to retail dealers.

MR. E. WILBUR PLITT: Mr. Chairman and Gentlemen: I have been much interested in what has been said. We have quite a bit of trouble in getting lambs of desirable weight to slaughter for our trade. In different months we require different weights. The early lambs, marketed in March and earlier, should weigh about 40 to 45 pounds. The reason for that is that the retailers sell these lambs in "quarters," and they desire light weights so that the quarters will not be too heavy for their trade. As the months advance, we want heavier weights; by April, lambs not under 50 pounds are preferred; June, 60 to 65 pounds; July, 70 to 72 pounds; and in August we desire

to have the lambs weigh around 75 pounds. The heavier weights are wanted in July and August because at this time of the year the usual run of lambs must have weight in order to have finish.

Some western lambs are bought by us for slaughter. Pelts from representative lambs that come from Chicago weighed from 15 to 20 pounds apiece. The carcasses from these lambs weighed from 30 to 38 pounds; when they fall below that they are so lacking in finish as to be undesirable; when they go above that the cuts are too heavy. We do not want buck lambs, as they are relatively heavy in head, neck and shoulder, and do not carry as much weight in the prime cuts as is desired. Even though these lambs are bought at a reduced price per hundredweight, their dressed carcasses often are as expensive as carcasses of good wether lambs. Lambs of poor quality cause the consumer to be displeased and thus reduce the demand for lamb.

Lambs coming from Maryland at this time of year are, on the average, very unattractive. However, I have recently bought some lambs from Maryland that were satisfactory. These lambs had received proper feed and care. If you use a good pure-bred ram and put some well-bred ewes in your flock, the quality of the lambs will be improved, and there will be a good demand for this better product. I have noticed, in dressing Maryland lambs, that some are so heavily infested by stomach worms and other parasites that the carcasses show extreme emaciation and are of but little value; the skin in some cases is so thin and weak that the pelt is of no value for use as leather. Parasites often damage the intestines to such an extent that they are useless for casings. Many casings are imported on account of this fact.

Producers sometimes ask whether we will buy sheep and lambs from them "direct." Although we are always in the market for slaughter stock, we prefer to get our supply from the stockyards rather than from the producer. There is a better opportunity at the stockyards to get the careful selection that is wanted, and, besides,

the competitive market is likely to be most satisfactory to both buyer and seller. I would not be misunderstood, however, and we are always in the market for good livestock, whoever may offer them.

The National Livestock and Meat Board has gone to the expense of hiring an expert meat cutter to conduct demonstrations to show retailers and others how to prepare small, attractive cuts from the lamb carcass. Mr. Hartzell, the expert who has been doing this work, has succeeded in putting the entire lamb carcass into cuts which are both palatable and attractive to the eye. This is an important development, and Mr. Hartzell's work promises to be of much help in the retailing of lamb, especially the parts of the carcass that heretofore have been less attractive in appearance, somewhat more difficult to prepare for the table, and not quite so palatable when served. A general adoption of the newer methods of cutting the lamb carcass should be of advantage to both the producer and the consumer.

I am glad to have had this chance to talk with you about problems that are of mutual interest, and shall be glad to answer any question if I can do so.

SENATOR WOLFE: How many lambs do you butcher now?

MR. PLITT: About 600 to 700 a week throughout the year.

MR. GRENVILLE LEWIS, St. Mary's County: Tell us what's wrong with Maryland sheep?

MR. PLITT: Some of the finest lambs grown in the United States come from Queen Annes County. The farmers are introducing better blood into their flocks and they give them good attention. A number of the best Maryland lambs are sent to Philadelphia in the belief that they will bring better prices there. If these good lambs are brought to Baltimore we will pay as much as Philadelphia buyers.

MR. H. DALTON, Baltimore County: Do you ever discount extremely fat lambs?

MR. PLITT: It is seldom that this is done, but, in a few cases, very fat lambs weighing over 90 pounds are discriminated against.

MR. G. B. FENWICK, Baltimore County: What market is there for Easter lambs?

MR. PLITT: That market is prevalent for only about three weeks, starting the Wednesday before Palm Sunday and lasting until the Wednesday after Easter. Trade that exists for these small lambs which weigh 35 to 40 pounds is brought about in a large part by the active buying by Greeks and others.

MR. D. C. WING, New York City: Would your business be profitable if you had only choice lambs?

MR. PLITT: Yes, it would suit us fine. The lower prices paid for the seconds does not mean that the consumers get cheaper meat. We prefer to handle the better lambs. The consumer does not necessarily profit by the lower prices for which "second" lambs sell. In many cases the better yield that is secured from prime lambs makes their cost "on the hooks" no more per pound than that of the lower grade lambs. Last year the top lambs sold for $13.75; seconds brought about $10 to $10.50. Some retailers would buy perhaps five "tops" and three seconds and sell all at the same price. The consumer would pay the same price for all.

MR. DALTON: Don't you pay the same price for all Maryland lambs, regardless of quality and condition?

MR. PLITT: No, we buy all lambs on their own merits.

Question: Did you say that, on account of parasite damage, casings from Maryland lambs are of little or no value?

MR. PLITT: Practically no sound casings are produced by Maryland sheep and lambs. Most of the casings used here are imported from Australia and New Zealand. Casings now sell for $2.85 per pound.

SENATOR WOLFE: The time has come when it is very important that we treat our ewes for stomachworms; I am going to do it this winter. If our ewes are freed from parasites, not only will they do better, but their

lambs will do better. I have two pure-bred sires, and last winter one of them got to looking very badly. I treated the ram for stomachworms, and after I treated him I never saw such improvement in a sheep. I treated him three times, and the improvement was so marked that instead of selling him to the butcher, as I had planned, I kept him. Years ago we didn't spray fruit, but now we spray all of it. Treat your ewes for stomach worms, all of them. In my experience, there is more money in sheep than in any other stock on the farm.

PRESIDENT HARVEY: Are there others who care to take part in this discussion? Mr. Richardson, may we hear from you?

MR. GEORGE O. RICHARDSON, Harford County: A good lamb crop has been raised this year from my farm flock, but I do not have anything to add to this very interesting and valuable discussion.

PRESIDENT HARVEY: One of our younger members, Mr. Stanley Stabler, with his brother, is raising early lambs, and we shall be glad to hear from him.

MR. STANLEY P. STABLER, of Montgomery County: Mr. Chairman and Gentlemen: Our market reports tell us that the bulk of the lamb crop is marketed in the fall and winter, with the result that prices at that time are comparatively low. Most of these lambs are produced on the range, where land and feed are cheap. It seems to me that it is useless for us in Maryland to try to compete with these lambs produced under cheaper conditions. We can, however, avoid this competition by finishing our lambs at light weights and marketing them early, before the price drops.

This is not only a sound marketing policy; it is also a sound production policy, as proved by many producers on the Eastern Shore and by some in the western counties of the state. This early marketing not only obtains a higher price per pound for the lambs, but also requires much less feed and pasture for a flock of a given size. The lambs use their feed more economically at light

weights and the early-marketed lambs are not retarded by parasites and hot weather. If the lambs are sold early, the ewes may be kept in much better condition and fed much more cheaply than if they are nursing lambs for a long period.

There is always a relatively good market for high quality lambs in spring and early summer, and it seems to me that our greatest opportunity in the sheep line is to keep well-bred stock, feed it well and market our lambs early.

PRESIDENT HARVEY: A word from Mr. David Cohen, an extensive buyer of Eastern Shore lambs, will be appreciated.

MR. DAVID COHEN, Talbot County. Mr. Chairman and Gentlemen: This round table has been very interesting. We buy a large number of lambs during the year, and our experience with Maryland lambs has suggested a few thoughts which I am glad to add to this discussion. There is need for better breeding stock if market lambs are to be what the buyer wants. The work of the Maryland Stockmen's Association in distributing good pure-bred rams through the Annual Ram Sale is a real service to sheepmen. The ewe flock should be carefully selected. Only ewes with good udders, capable of providing well for one or two lambs, should be kept in the flock; ewes with bad udders should go to market. The buyer is interested in the improvement of market lambs, and we encourage the early castration of male lambs that are to be marketed after they are old enough to become "bucky". The poorly bred, "bucky", thin lamb is not the most profitable lamb for anyone.

PRESIDENT HARVEY: Professor Hunt of the University of Maryland has done some survey work which has yielded interesting information. Professor Hunt will tell us briefly something of his findings in this work.

MARYLAND METHODS AND RESULTS

BY W. E. HUNT, College Park, Md.

Mr. President and Gentlemen:

In the few minutes which have been allotted to me on this morning's program, I wish to call to your attention a few facts regarding "Maryland Methods and Results" as obtained by a survey made by the Experiment Station in the leading sheep counties of the state. Many of you are familiar with this survey. I see in the room a number of men who very kindly submitted to the lengthy and detailed cross-examination necessary to obtain the information asked for in this survey.

In connection with the survey it was deemed advisable to obtain some first-hand information regarding carcass quality of Maryland-raised lambs. To obtain this information, the Experiment Station purchased lambs from producers who were feeding and managing their flocks in ways found to be typical of Maryland production methods. These lambs were obtained from producers in one of the well-known early lamb producing sections on the Eastern Shore. These lambs were carefully graded on foot and put through a detailed slaughter and carcass study.

From these studies it was found that about half of the lambs produced for the early lamb market are not sufficiently well finished nor of the conformation and quality to command attention on the part of the lamb trade. Consumers of early lamb require a quality product. They do not hesitate to pay a premium for quality. If sufficient first quality lambs are not available, some lower grade lambs can be used. This is about the situation as it has existed for Maryland producers during the past. However, because of the attractive market for early lambs, producers in other states, less favorably situated than Maryland in respect to markets, have been attracted to this type of lamb production. Many Maryland lambs have already felt the pressure of this competition. Producers in other states realize the importance of good

form, quality and finish in early lambs and are breeding and feeding their flocks so as to produce the kind of lambs that will be sure to sell advantageously. Maryland producers must take steps to further improve the average quality of their lambs if they are to continue to enjoy their present early lamb market.

The survey of Maryland's sheep industry has revealed three weak points in Maryland methods which if given proper attention will strengthen the position and favor of Maryland lambs on local markets. These are (1) a more general use of purebred rams of correct type and quality (2) a generous use of proper feeds, especially legume hay and winter pasture and (3) improving the general thrift of flocks by controlling internal and external parasites.

A great deal has been said and many figures quoted regarding the value of purebred rams for siring market lambs. In the last few years, there has been a big increase in the number of purebred rams at the head of Maryland flocks. The proportion of flocks headed by purebred rams as determined by the survey was found to still be entirely too small. The first essential in the production of good quality lambs is a good sire. A large proportion of Maryland lambs are not of the form, quality and finish desired by the lamb trade, because of the handicap of poor breeding. It is not sufficient, however, that the rams heading Maryland flocks be just purebreds. They should be thick, meaty, compact, short-legged, rugged, masculine rams, rather than the long bodied, up-standing, narrow-bodied, long-legged, fine-boned rams, so frequently found. You have all seen figures regarding dollars and cents values of good rams, but I thought you might be interested in some Maryland figures. One of the men from whom lambs were purchased for the slaughter test has at the head of his flock, a purebred Hampshire ram of very good type and quality. He is a thick, low-set, strong-boned , rugged sheep. Another man living in the same neighborhood and handling his sheep in practically the same way has

a grade ram at the head of his flock. This ram is a good ram as grade rams go. These men have ewes of similar origin, obtained from the same dealer. At approximately the same age the lambs sired by the purebred ram weighed 85 pounds; those by the grade ram, 63 pounds. The dressing percentage of the lambs sired by the purebred ram was 52.1%; those sired by the grade ram 47.3%. The carcasses of the lambs sired by the purebred ram were graded low choice on the average; those from the grade ram, low good. The carcass value per head was $12.48 for the lambs sired by the purebred ram and $8.72 for the lambs sired by the grade ram, or, expressed as value per 100 pounds liveweight, the lambs sired by the purebred ram were worth $15.64; those sired by the grade ram $12.76. In the light of these figures, does it seem to you that a good purebred ram of correct type and quality is a good investment for Maryland lamb producers?

Important as is the sire at the head of the flock, it is not the only point at which many Maryland producers are falling down in their attempt to produce good market lambs. Without sufficient feed of the right kind, choice lambs cannot be produced. The survey has shown that the most common deficiency in Maryland sheep rations is the total, or almost total absence of legume hay. On the Eastern Shore and through parts of southern Maryland, there is a tendency on the part of many producers to rely too much on winter pasture. In fact, a rather typical method of handling flocks in the early lamb sections of the Eastern Shore is to raise them on wheat entirely until about April 15th and then run them on a meadow pasture, which usually is a field cut the previous season for hay. No supplementary feed of any kind is given except on those rare occasions when the snow would be so deep for a day or two that the sheep could not get down to the wheat. In other sections of the state it would be possible to improve the efficiency of the winter ration and reduce their costs if more use was made of the winter pasture than is typical of the present

methods. In all sections of the state rations would be more efficient and results better if legume hay were made the basis of the winter ration. If sheep are kept in good thrifty condition and have an abundance of good pasture, very little grain is necessary in order to produce satisfactory lambs. The value of good pastures, in producing good quality lambs is illustrated by the lambs obtained from two other Maryland producers. Both flocks were headed by purebred rams. There was no additional supplementary feed fed except during very bad weather. The one flock, however,had wheat pasture to graze and following this a good summer pasture. At all times pasture was abundant. The other flock grazed an old native pasture, which all summer, as well as all winter, was chewed right down to the ground. This pasture, however, was a typical pasture for that section of the state. In real bad weather this flock was fed a little mixed hay. About three loads were fed to a flock of about 85 ewes during the winter. The sheep which had access to good pasture, produced lambs which weighed 85 pounds in 95 days. Those with the poor pasture, produced lambs which weighed 68.6 pounds in 93 days. The carcasses from the first group were graded low choice; the carcasses from the second group were medium (one and two-thirds grades lower). The dressing percentage of the lambs on good pasture was 52.1%; those on poor pasture 45.7%. The carcass value per head was, in the first case, $12.48 and in the second case $8.21. The live value per 100 lbs. was $15.64 and $11.86. This shows comparatively the importance of an abundance of feed. You will notice that the man who invested in a good purebred ram, but failed to feed his flock adequately, obtained no better results than the man previously mentioned, who used a grade ram, but who provided them with an abundance of good pasture.

The value of adding mixed hay containing considerable clover to the ration and feeding shelled corn to the lambs, is shown by comparing the results obtained from two other flocks. These men, it happens, were using grade

rams. Their ewes, as in other cases, were similar in character. The man who added mixed hay and shelled corn to his winter pasture, produced lambs in 74 days that were of the same weight and grade as the man who relied entirely on winter pasture produced in 93 days. The lambs fed corn in creeps dressed 53.0%. The flock which received no additional feed dressed 47.3%. The lambs fed corn in creeps were worth $2.06 per 100 pounds more than those which received no grain. The second step, therefore, in the production of good quality lambs is to supply the flock with an abundance of feed of the right kind and quality.

The third step is the matter of keeping the flock thrifty and healthy. The survey showed that very few producers were regularly treating their flocks to control internal parasites of which, as you know, the stomach worm is the most frequently serious. The majority of these men stated that they had no trouble from internal or external parasites. Examination of their flocks, however, frequently revealed a lack of thrift, which in some cases, was due to inadequate winter feeding, but often was due to the presence of stomach worms. A greater use of temporary pastures and the fencing of fields so that after-math and stubble can be grazed will be of material assistance in reducing losses from stomach worms, especially through central and western Maryland. Internal parasites on the Eastern Shore, in many instances, have not been serious, because of the fact that sheep there are usually run on fields which are in regular crop rotations. Many have small permanent pastures. The regular treatment of all flocks and the use of temporary pastures will assist in improving the general thrift of Maryland sheep.

A parasite which is becoming more and more serious is the nodular worm. This parasite is the one which causes the knots or nodules on the intestines and does its damage by reducing the digestive and absorbing areas of the intestinal tract. No very effective medicinal treat-

ment is known for this parasite and it must be largely controlled through the use of clean pasture.

Very few Maryland producers are regularly dipping their flocks for the control of external parasites. Very few reported any trouble from lice or ticks and the presence of scab was mentioned only in hushed words. The sheep louse is a very common parasite in this state and, unknown to many producers, is causing a great deal of loss directly by loss of wool and indirectly by the impairment of the health of the sheep. At times in the recent past sheep scab has been so prevalent in the state that the federal authorities were considering the advisability of placing a quarantine on Maryland sheep. Such a situation is indeed serious and Maryland producers should take active steps towards the control of these external parasites. At the present time the state of Maryland has no rulings regarding the health of sheep admitted into the state. This accounts for some of the trouble recently experienced with scabs. It seems to me that sheep producers should take steps to incorporate rulings regarding the health of sheep in the regulations of the State Livestock Sanitary Board. The regular dipping of flocks will not only reduce direct losses from ticks, lice and scab, but the dipping has a beneficial effect on the growth and quality of wool. Regular dipping should be made a part of every sheep project.

Three steps, therefore, in the production of lambs suitable for Maryland trade are: First, the use of a purebred ram of good type and quality. Second, adequately feeding the flock, including a judicial use of winter pasture and the providing of legume hay for winter feeding. Third, keeping flocks thrifty and controlling internal and external parasites. More general observance of these three points by Maryland producers will improve the profitableness of many Maryland flocks, and supply lambs that will stimulate the demand for lamb because of their excellent quality.

Adjournment.

SECOND SESSION
CLAREMONT HOTEL

The second session,—an evening session, was held at the Claremont Hotel, Union Stock Yards, Baltimore, in the form of a dinner-meeting, with a large, enthusiastic attendance. The brief, hospitable address of welcome from J. H. Baugher, President of the Union Stock Yards Company, also a member of the Maryland Stockmen's Association, was received by the guests in just the spirit in which it was made, and the best of good feeling characterized the interesting session which was begun by a good dinner in the hotel and was ended by an extended program in the large rotunda of the hotel. Good fellowship prevailed; live stock farmers rubbed shoulders with each other and with men engaged in other phases of the livestock business; acquaintanceship was promoted; and it seems certain that the best interests of the livestock industry in Maryland were substantially aided by the discussions, formal and informal, that characterized the session. There is an intangible something (and not so very intangible, either) about getting together at the Stock Yards which makes the meeting distinctly a livestock affair, and the January, 1930, session was no exception.

In addition to the cordial address of welcome by Mr. Baugher, short interesting addresses not listed on the regular program, were made by Dean and Director H. J. Patterson, who spoke briefly of his recent trip to Europe and of the need of equipment for livestock work at the University; Mr. D. A. Spencer of the United States Department of Agriculture, who told of the work of the Department with special reference to the livestock activities; Mr. J. W. Jones of Montgomery County, representing the Maryland Farm Bureau Federation, who expressed his active interest in the work and meetings of the Association; Dr. F. B. Bomberger, Chief of the Maryland State Bureau of Markets, who spoke of Danish cooperation in livestock production and marketing, and

of the need for careful attention to production and marketing problems in Maryland; Mr. DeWitt C. Wing of the Rural New-Yorker, New York City, who discussed in a brief way a number of agricultural matters; Mr. Walter Peppler of Corkran, Hill & Co., Baltimore, who voiced the willingness of packers to cooperate heartily with producers in every possible way; Dr. DeVoe Meade, Chief of the Department of Animal and Dairy Husbandry, University of Maryland, who called attention to some important problems which concern livestock producers in Maryland.

PRESIDENT HARVEY: The general topic "How May Maryland Stockmen and Fair Associations More Effectively Cooperate" is scheduled for a round table discussion tonight, and we shall ask Dr. Charles H. Conley of Frederick County to open the subject; Doctor Conley is a fair official and an exhibitor of purebred livestock, and is President of the Maryland State Fair Association.

THE DEVELOPMENT AND VALUE OF THE COUNTY FAIR

DR. C. H. CONLEY, Frederick County

President of the Maryland State Fair Association.

Mr. President and Gentlmen:

Does the County Fair justify its existence and should it be encouraged? The origin of these Fairs, in this State, was simple. Horses were common, some were better than others, but how could it be proved? Why, by having a horse show. And from these simple little horse shows have descended our great County Fairs, which have become highly complicated shows. In this day of high prices, attention should be called to the practical and beneficial side of the Fairs so that we may receive the financial support, to which we are entitled, to enable us to continue the high standards we have maintained, in producing the County Fairs of Maryland. The managements of our Fairs consist of groups of men who

not only have invested in the Associations without expectation of any return, but who also give their time freely to the management, purely from an unselfish sense of duty. As soon as one year's Fair is over, work must be immediately started arranging the numerous exhibits and procuring the many amusements for the next year's Fair; and to plan so that everything might function smoothly, entails laborious work on the part of the management.

The money, with the exception of a few hundred dollars received from the State and elsewhere, necessary for the upkeep, for the new buildings, for the premiums, and all the other expenses, must be earned in the four days out of the year that the Fair is open. And, remember, bad weather often reduces the attendance to such an extent that the gate receipts do not meet actual operating expenses. The serious reason for the Fairs is their education value.

Imagine the immense cost of an attempt on the part of the manufacturers to exhibit their machinery to the individual. The Fair not only permits the manufacturer to exhibit to the entire community, but enables the individual to compare the different varieties and judge for himself those suitable for his particular needs.

We all know the marvelous improvement in livestock. The milk production of dairy cows has increased by leaps and bounds. Sheep, hogs and beef cattle are produced to an almost mechanical standard. Poultry has kept pace with the dairy cow. How has all this come about? By good breeding. But it is by exhibiting at the Fairs that the breeders have been able to compare their results and obtain the types, suited to their individual needs, that have enabled them consistently to improve their stock. And the spread of their labors through the County Fairs certainly has proved in dollars and cents the benefits of the Fair to its community.

The State subscribes a substantial amount of money to the University for the benefit of the Maryland farmers. We know something of the good work the University

has done. But in order to be of benefit to the farmers, the results of this work must be disseminated among them. The College is not of easy access to the majority, and, further, many have not the time to go there. To communicate with them by mail is not practical, so the only real outlet is by means of the County Fairs. At the Fairs, University workers are able not only to exhibit their results of agricultural research, but also to talk to the farmers individually and collectively to learn their troubles and to suggest remedies,—on the spot.

We all know that improvement comes only through education, especially in farming. For some years we have taught farming in our schools, and to further the interest of the boys and girls there have been organized various livestock and crop clubs. The results of these clubs have exceeded all expectations, both in the interest shown and the improvement of livestock on the farms. To enable these clubs to succeed, shows must be held for judging, and prizes must be awarded. Naturally the Fairs have become the place for these competitions, and they have seized with great pleasure and enthusiasm the opportunity to forward the success of these Future Farmers of Maryland. They have allotted space particularly for these boys and girls to use in exhibiting their stock; have awarded prizes to them,and set aside definite times for their schoolmates to inspect the various exhibits of the Fair, all with the idea of aiding and encouraging their competitions. Without a doubt this is the greatest work being done for the benefit of the State, agriculture being one of the State's greatest industries, and it is through the County Fairs that much of this work may be carried on to best advantage.

In conclusion, I believe that the Fairs justify their existence, and I hope that the day will soon come when the people realize that a Fair has its practical side, like any other business, and will help to share the financial load that a few unselfish men are laboring under for the pride and good of their communities and will see fit, thru the State, to aid them in carrying on the Fairs. It

would be a good investment, one that has proven productive in many other States.

PRESIDENT HARVEY: What Doctor Conley has said deserves careful consideration by every one of us.

PRESIDENT HARVEY: Mr. Ray Norman of Harford County, successful and experienced exhibitor of purebred livestock, will present his views on this subject of cooperation between fairs and stockmen.

HOW MARYLAND FAIRS CAN BETTER COOPERATE WITH STOCKMEN

BY RAY NORMAN, Street, Harford County

Mr. President, fellow stockmen:

We have exhibited stock at nearly every state fair east of the Mississippi river, from Massachusetts to Florida, and at every one of these fairs we have seen a tragedy, the tragedy of the nearby farmer making his first exhibit of stock. He comes in full of enthusiasm, with great hopes, but nearly always, so complete is the domination of the state fairs by the professional exhibitor, that the novice wins nothing or very little. He returns home, with nothing to show his neighbors in ribbons, and with little or no cash to cover his outlay in time and money. Nine times out of ten he never comes back, loses his interest in purebred stock to a great extent, and is likely never to develop into an asset to the purebred business.

I believe the remedy for this,and something that would in a few years have a great deal of effect in making the Maryland stockman regard his State show as something belonging to him, instead of a sort of show where he comes and inspects very casually the good animals displayed by the exhibitors from many other states, is to use part of the very liberal classifications offered at present, in making a small classification for the exhibitors of this State who do not make a circuit. This would enable the farmer exhibitor to pay expenses; would keep up his interest, and in a very short while he would have stock

of good enough quality and well enough fitted to divide winnings with the professional. This classification is a feature with several good fairs,among them the New York State Fair, and it works well there. An example of how it works at home may be remembered from the cattle show at Timonium last year. The Ayrshire classification was dropped from the usual amount to a classification that would not pay the large herds to make the show. As a result, the nearby breeders for the first time showed their cattle. They had them in splendid shape, and made a really impressive show. These farmer breeders have gotten into the spirit of the thing, and I believe will show against any breeder from now on.

This is not suggested in a selfish spirit, as Mr. Harvey knows we have never left the Maryland State Fair without winning a reasonable share of the premiums offered. It is merely offered as our earnest belief that it will help to keep the new breeder from losing interest and going back to grade stock, as I have seen many do who have exhibited at our fairs in the past.

Our county fairs should be kept local; their exhibits should be from the county and adjoining counties. This would prevent the "carnival"or "string exhibitor" from coming in with every breed, of very poor quality, and taking away hundreds of dollars of premium money that could have been edded to the lists so as to encourage good stock at home. This would be especially helpful to the poultry shows, where the string exhibitor often wins from five hundred dollars a week up.

Do not limit the list of varieties for which you offer premiums, but accept only entries from the home county or adjoining counties.

With the traveling showman our State Fair is one of the most popular shows on the Eastern and Southern circuit. Let us make it the Maryland Stockmen's Fair as well.

PRESIDENT HARVEY: This suggestion by Mr. Norman is definite and constructive, and if adopted should encourage the local exhibitor in his first showing experience.

PRESIDENT HARVEY: Mr. J. Herbert Snyder of Carroll County, a breeder and exhibitor of purebred livestock, and also a fair official, will now be heard.

COOPERATION BETWEEN STOCKMEN AND FAIR ASSOCIATIONS

J. HERBERT SNYDER, Carroll County

Mr. President, and Gentlemen:

In many of the famous lawsuits and murder trials there are certain personages called on to testify. But before being allowed to do so it is necessary for them to qualify as experts. Now this is not a murder trial. Neither do I propose to qualify as an expert. There are three reasons why I should be particularly interested in this subject. The first is that I am a stockman; the second is that I exhibit at the fairs; and the third is that I am an official of a Fair Association. Being all these three sometimes makes you divided against yourself. Last fall for one week I was a Fair official, but for the other nine I was a breeder and exhibitor.

First, I want to say a few words directly to the stockmen. Remember that the fairs are not money-making propositions, but that they are organizations giving a definite and distinct service to a community. Many of them are deeply in debt; I am sorry to say that most of them are. The directors are giving their time, their talents, yes, and their money, that these fairs may exist. When you feel called upon to criticise a fair board for what you call their stinginess just remember that these men are trying to make one dollar do the work of two.

Now, here is the first way stockmen may cooperate with the fairs. Support your fair. I will not take the time to enumerate the advantages of having a fair in a community, but only will say that it is worth dollars and cents to livestock breeders. If my neighbor goes to a fair and sees a nice herd of Poland-China hogs, he likes them and decides to go into the business. He has heard that I raise Poland-Chinas, so over he comes. I

then have a potential buyer directly from the results of a fair, although I did not exhibit. A good exhibit at a fair advertises your breed. Attend the fairs. Get your neighbor to attend. It is on the attendance of you and your neighbors, of John Smith and his neighbors that these fairs exist. After all these neighbors attend, then the directors will be in a position to furnish better equipment and to pay better premiums.

Most of you live within a reasonable distance of a fair. Do you exhibit? Why not? You do not have the time. It is not worth the trouble. Your stock is not good enough, or it is too valuable to risk at fairs. If these are your reasons, forget them and exhibit at your county fair. That is the second way that you can help the fairs. Make it a part of your local pride to have a representation of your herd there each year. Exhibit,—win or lose. If you lose, go back next year with a better herd. You never learn anything until you get licked. Have your herd reasonably fitted and give them proper care while at the fair. Many a good herd has been disgraced through the lack of proper care by the owner.

Now a word to the representatives of the fair associations. It is for you to remember that your livestock exhibitors are at a big expense in exhibiting at your fair. It takes time and money to get a herd ready and to exhibit it. The higher premiums you pay, the higher class exhibit you can expect. Pay all that you feel you can afford to pay. Give your exhibitors the best treatment you can. A satisfied exhibitor is the best booster you have. Pay your premiums as soon as your finances will permit. Pay your traveling herds when they leave, if possible. These men are traveling on their prize money, and railroads and feed dealers will not take promises.

When you are preparing your catalog call in some livestock exhibitors and get their ideas on classification and rules governing the class of livestock that they are interested in. Some catalogs were written fifty years ago and have never been changed. Follow a standard set of

rules and a standard classification. I would suggest that the State Association of Fairs and the Stockmen's Association appoint a joint committee to work out a suitable set of rules for Maryland fairs.

There is a place where fair officials and Stockmen can work as one, and that is in regard to State aid. Work to continue the appropriation from the State, for this is a distinct part of public service. Get both the State and County to exempt your grounds from taxation. They can do it if they so desire. Keep after your State senators and delegates to see that they do this. Take them to the fair and show them what a fine work it is doing.

The fair associations are performing a real agricultural service to the state. It is only with your cooperation and help that this service can be of the greatest value to all.

PRESIDENT HARVEY: Mr. Snyder, too, has given us all some real food for serious thought. Is there anyone else who has a word to say before we close this discussion?

PRESIDENT HARVEY: Professor Wells E. Hunt of the University of Maryland will briefly summarize this round table discussion.

PROFESSOR W. E. HUNT, University of Maryland: The Chairman has asked me to summarize the various suggestions made regarding the improvement of livestock exhibitions at Maryland Fairs. From the discussions by Dr. Conley, Mr. Ray Norman, and Mr. Herbert Snyder, the following points seem to be outstanding:

First: The Fair Associations perform a useful and valuable service for agricultural communities by their setting up of standards for agricultural production and measuring agricultural progress.

Second: Many Maryland stockmen fail to realize their value or participate in their benefits because they do not take part in the exhibitions.

Third: Livestock classifications at the majority of Maryland Fairs are more favorable to outside jockey showmen who exhibit a wide variety of well known and

little known breeds, than they are to local breeders or outside breeders who have herds and flocks of merit.

Fourth: Livestock classifications should be confined to those breeds of economic importance in the state. The livestock classifications at the various fairs in the State should be standarized if possible.

Fifth: In addition to the open classes, many fairs could afford to have a State class in which only Maryland breeders are eligible to participate.

MR. K. A. CLARK: At the request of Doctor Conley and others I appeared before the State Association of Fair Officials some days ago and made some suggestions looking toward a standardization of fair classifications. There seems to be an opportunity for some definite co-operation between stockmen and fair officials for the purpose of making our fairs more nearly uniform in classifications and premium lists. I move that there be appointed, by the President, a Fair Committee of three members whose duty it shall be to further this movement in any possible way. Seconded and carried.

PRESIDENT HARVEY: We are indeed fortunate in having Mr. Paul Gerlaugh of the Ohio Experiment Station, with us again tonight. Mr. Gerlaugh will discuss some important results secured from experiments conducted in Ohio, and I am sure that what he says will be of much interest to Maryland stockmen.

MORE BEEF PER ACRE

BY PAUL GERLAUGH

Ohio Agricultural Experiment Station,
Wooster, Ohio.

Mr. President and Gentlemen:

In the discussion of live stock feeding at the forenoon session an attempt was made to show that livestock feeders are sometimes led to think in terms of production practices that may not lead to the most profitable farm return.

I imagine it is safe to assume that the majority of cattle fed in Maryland are fed in order to convert farm-raised feeds into beef. It is equally safe to assume that the cattle-feeder hopes for the best possible return to himself, rather than for his steers, to outgain or outsell his neighbors. Important as are the two items of gain and selling price, they are not always safe guides as to the profitableness of a feeding business.

During the latter part of the summer the farmer begins to forecast his coming supply of corn. As the crop matures he revises his estimates and makes further plans relative to utilizing the crop. The cattle-feeder with a field of corn to be fed to cattle wonders how he can feed that corn into beef so as to get the most return from the field of corn. I am quite sure that the net return from the field of corn is the more important point with this man.

I know little about the automobile business, but I feel quite certain that the Ford Automobile Company makes more profit on a Lincoln than on a Ford. I also believe that in a year's time the manufacture of Fords returns more profit to the company than the manufacture of Lincolns. Profit per car is not responsible.

A year ago the Ohio Experiment Station planned a test to study the returns per acre of corn, handled by different methods and fed to similar cattle. The test was conducted at the Madison County Experiment Farm under the direct supervision of H. W. Rogers.

Six and one-half acres of corn were put into a silo and a similar area, obtained by alternating 12-row strips through the field, was cut, shocked, and later husked and cribbed. The corn was put into the silo when well dented. Approximately one week elapsed between the time the silo was filled and the time when the corn intended for the crib was in the shock. 312 bushels of corn was husked and cribbed from the six and a half acres that was shocked. Due to the method of dividing the standing corn in the field we are safe in stating that a very similar yield went into the silo.

On the 21st of November, 14 head of yearling Hereford steers of choice quality and weighing 615 pounds, were started on the job of consuming the six and a half acres of corn that we placed in the silo. Ten head of similar cattle drew the assignment of turning the six and a half acres of corn that we had placed in the crib and the resulting bundle stover which was in the shock, into beef. Each steer, regardless of lot, was given two pounds of cottonseed meal per day, and mixed hay. Inas much as the cottonseed meal consumption and the mixed hay consumption were practically the same in each lot, these two items will be dropped from further discussion.

The silage-fed steers consumed 47 pounds of silage per day. This is the average for the entire feeding period. The corn-fed cattle consumed 16 pounds of shelled corn per day for a feeding period of similar length.

On March 11th the crib was empty but much silage remained in the silo. We weighed and valued the cattle in each lot and continued feeding corn and stover to the corn-fed lot until the six and a half acres of corn in the silo was no more. On May 14th our silage supply gave out. We weighed the cattle and again had a market valuation placed on them.

The corn fed to the cattle in Lot 2, the shelled-corn-fed cattle, from March 11th to May 14th was from the same field from which the silo had been filled and from which the feed supply for the corn-fed lot had come. We had a yield of 48 bushels per acre on the area originally assigned to the crib. The amount of corn consumed by the Lot 2 steers from March 11th to May 14th was reduced to the acre basis by dividing by 48. This method we consider absolutely fair.

From November 21st to May 14th, a period of 174 days, the 14 silage-fed steers ate the corn that had been grown on the six and a half acres. One acre of this corn fed through the silo had 375 "steer day" feeds on it. That is, it would have fed one steer 375 days. During the same period the ten steers fed shelled corn ate

the feed from ten and a half acres. An acre of corn fed through the crib gave us 166 "steer day" feeds. I repeat, 375 "steer days" per acre through the silo and 166 "steer days" per acre through the crib.

For each "steer day" ration from the silo we received 2 pounds of gain on the steers. For each "steer day" ration from the crib we received 2.25 pounds of gain on the steers. Reduced to the acre basis we received 752 pounds of gain on the steers from an acre of corn through the silo and 372 pounds of gain from an acre of similar corn placed in the crib.

Valuations were placed on the cattle by market representatives May 14th, and the test closed, so far as our acre comparisons were concerned. Lot 1 was valued at $14.00 and Lot 2 at $14.75 on basis of the Pittsburgh market.

Hogs followed each lot of cattle and a third, or check, lot of similar hogs, were fed by themselves. From the feed requirements of the third lot of pigs we found that the pigs following the silage-fed cattle salvaged sufficient feed from following the cattle to credit 39 pounds of pork to each acre of corn put into the silo. The pigs following the corn-fed cattle produced sufficient gains to credit 67 pounds of pork to each acre of corn fed to this lot of cattle. We obtained a total of 791 pounds of gain on both the cattle and the hogs from an acre of corn fed by the silo route and 439 pounds of cattle-and-hog gains from an acre of similar corn fed by the crib route.

On the basis of weights and valuations of the two lots on May 14th, there was a return from an acre of corn fed by the silo route of $71.65, and by the crib route $50.80. This does not take into consideration the cost of handling the corn, the interest on the investment, the labor of feeding, nor the bedding; neither does it consider credit for manure produced.

The officials of the Dayton Union Stock Yards asked us to hold the cattle three weeks longer and take them to their show and sale, simply to show the results of the test. We did this. Year-old silage was fed to the one

lot, and the other lot continued on their regular corn ration. Relative to this period it is sufficient to say that the silage-fed cattle gained 64 pounds and the corn-fed cattle 67 pounds. The cattle were trucked from the farm to Dayton, exhibited there, and sold at auction. The Hughes Provision Company of Cleveland bought both lots of cattle. The silage-fed cattle sold for $14.50 and the corn-fed cattle for $15.15 per cwt. It is interesting to note that there was two pounds more shrink between feed lot weights and selling weights of the silage cattle than of the corn-fed cattle. This difference in shrink is negligible.

The corn-fed cattle dressed 60.6 per cent, and the silage-fed cattle 59.6 per cent. The carcasses of both lots of cattle were excellent. The color, covering, and firmness of flesh of both lots were very satisfactory. The carcass from one of the silage-fed steers was bruised en route, and one of the silage-fed steers had done none too well in the feed lot, due, according to observation, to disposition rather than ration. Mr. Hughes stated that, with the carcasses of these two steers out, the balance of the carcasses would go out to the trade at the same price. He was pleasantly surprised with the carcasses of the silage-fed cattle. He was also pleased, and rightfully so, because the silage-fed cattle cost him $23.66 on the rails and the corn-fed cattle $24.23.

There has been a lot of undue criticism laid at the door of silage-fed cattle. Cattle buyers have made statements to the effect that silage-fed cattle would not "dress" and that they would kill "off color" in both fat and lean. The cattle produced by this test would not justify these criticisms. Mr. Hughes said that he was satisfied that the carcasses yielded by the silage-fed cattle were absolutely comparable with carcasses from strictly corn-fed cattle in a similar degree of flesh. In other words, had the corn-fed cattle of Lot 2 been killed about three weeks sooner, when their gains and finish were comparable to those of the silage-fed cattle of Lot 1 when killed, the dressing percentage and carcasses would have been equal.

It is important, so far as the farmer is concerned, to know that, in spite of the fact that the corn-fed cattle gained more rapidly, had more gains on the pigs following them to their credit, sold for more money when marketed, and yielded a higher dressing percentage, they were the least profitable, so far as the two lots were concerned. The silage-fed cattle returned $20.00 more per acre of corn fed than did the cattle fed shelled corn and stover. To the great majority of our corn belt feeders this is the important point.

PRESIDENT HARVEY: We will now hear from Doctor T. B. Symons, Director of the University of Maryland Extension Service who will announce the winner of the silver cup and the winners of the gold prizes offered by The Wm. Schluderberg-J. T. Kurdle Company.

Mr. Chairman and Members of the Maryland Stockmen's Association: It is a great pleasure for me to participate in this enthusiastic meeting for the promotion of the livestock interests in this State and to be asked to announce the winners in the 1929 Maryland Litter Contest.

The representatives of our Extension Service and Institution as a whole are deeply interested in the promotion of our livestock industry. We feel that our geographical position, our soil and climatic conditions, and particularly our nearness to good markets, offer unusual opportunities in the livestock field.

Many years ago I suggested the slogan, "A Million Sheep for Maryland Farms." We are making some progress in the improvement and development of our sheep industry. Many purebred rams have been brought into the State and the ram sales conducted in different sections have been unusually successful.

We are likewise developing our baby beef project with considerable interest being manifested by our boys' clubs as well as adult producers in the further development of the industry. Nothing, it seems to me, has served as a greater impetus to this industry than the spendid Livestock Show that was recently held in Baltimore. I be-

lieve that the holding of this show with such a fine display of cattle, and particularly feeder stock, will serve as a splendid incentive toward developing our fat cattle industry as well as aid our baby beef club work.

We are naturally interested in developing our hog industry, and it was with a great deal of satisfaction that we welcomed the opportunity to cooperate with The Schluderberg-Kurdle Company in offering prizes to encourage entries in the 1929 Maryland 150 Day 1,500-Pound Litter Contest. I am pleased to say that we have had 26 entries from eight Counties in the contest the past year. We believe the allocation of prizes, both State and County, for encouraging this contest by this progressive firm is the very best way to encourage our hog industry, and by encouraging this litter contest we are developing the industry intelligently. We feel that it brings out the importance of low cost and efficient production. Naturally with the demand for fluid milk we cannot expect our farmers to feed hogs when they could more profitably devote their feed to milch cows. On the other hand there are many sections where the milk industry is not so dominant and, of course, even within our milk sheds our farmers can raise a limited number of hogs profitably.

We want our farmers to realize the unusual marketing facilities offered for pork in Baltimore City by the packers and at these splendid stock yards where sales take place every week-day and where the best porkers bring as good prices as any place in the country. We sincerely hope that the further encouragement of this Litter Contest by the generosity of The Schluderberg-Kurdle Company will be an important influence in the development of better methods of breeding, feeding, and managing hogs for our markets.

I am now pleased to announce the winners in the Contest.

It is now my pleasure to announce that Messrs. J. S. and E. T. Cullen, of Cecil County, brought a litter of 13 pigs to a weight of 2161.5 pounds at 150 days of age,

and by so doing won this handsome silver cup provided by the Maryland Agricultural Society—The Maryland Farm Bureau Federation. As is the custom, the name of the winner and the record of the winning litter will be engraved on this cup, the custody of which now goes to Messrs. Cullen for one year; if this cup is won three times by one person it will become his permanently. Also, the State first prize of $100 in gold and the Cecil County prize of $25 in gold, offered by the Schluderberg-Kurdle Company go to Messrs. Cullen and will now be delivered into their possession by Mr. W. K. Freiert, who is with us tonight representing Mr. William F. Schluderberg of the Schluderberg-Kurdle Company.

Later Director Symons announced other winners as listed below, and gold prizes were delivered by Mr. Freiert.

The William Schluderberg-T. J. Kurdle Company Gold Cash Prizes

1929 Maryland 150-Day 1,500-Pound Litter Contest

Name	State Placing	Gold Prize	County Placing	Gold Prize
J. S. and E. T. Cullen	1	$100	1	$25
Ralph T. Wilson	2	$75		
E. Earl Remsberg	3	$50	1	$25
C. Claude Cissel			1	$25
Charles Ellwanger			1	$25
Robert Moore			1	$25
Ira C. Doub			1	$25
O. E. Yerkey			1	$25
		$225		$175

Total gold prizes won, $400.

Statements from the eight winners of the prizes are given on the pages following the tabulations of 1929 and other contests.

MARYLAND 150-DAY 1500-POUND LITTER CONTEST

1929 Litter Contest Entries

Name	County	Breed	Pigs in Litter	Date Farrowed
Chas. Ellwanger	Caroline	Poland-China	11	March 16
Louis Hines	Caroline	Poland-China	10	March 14
Calvin H. Todd	Caroline	Berk. x P. C.	11	March 20
J. S. & E. T. Cullen	Cecil	Poland-China	13	March 2
J. S. & E. T. Cullen	Cecil	Poland-China	6	May 5
Ralph T. Wilson	Cecil	Poland-China	10	March 10
Emerson Bradley	Dorchester	Poland-China	10	March 27
E. Earl Remsberg	Frederick	D. J. x P. C.	10	April 22
T. E. Zimmerman	Frederick	Berk. x P. C.	9	May 12
C. Claude Cissel	Howard	D. J. x P. C.	13	May 14
C. Claude Cissel	Howard	Duroc-Jersey	9	May 4
Edward Clarke	Howard	Berkshire	10	April 16
O. E. Yerkey	Kent	D. J. x P. C.	10	March 22
O. E. Yerkey	Kent	Poland-China	8	March 20
Maxwell Graybill	Montgomery	Berkshire	11	March 21
Maxwell Graybill	Montgomery	Berkshire	11	March 20
Brooke Moore	Montgomery	Berkshire	10	April 7
Robert Moore	Montgomery	Berk. x D. J.	11	March 8
G. Carlton Oland	Montgomery	Duroc-Jersey	10	April 2
G. Carlton Oland	Montgomery	Duroc-Jersey	10	Feb. 25
Stanley P. Stabler	Montgomery	Duroc-Jersey	8	March 7
Stanley P. Stabler	Montgomery	Duroc-Jersey	8	March 4
Stanley P. Stabler	Montgomery	Duroc-Jersey	8	March 8
G. M. Wolfe	Montgomery	P. C. x (D. J. x P. C.)	11	Feb. 10
Ira C. Doub	Washington	Poland-China	10	March 1
F. C. Ernst	Washington	Poland-China	8	April 2

1929 Litter Contest; Results With Successful Litters

Name	County	Breed	Pigs in Litter	Wt. at 150 days
J. S. & E. T. Cullen	Cecil	Poland-China	13	2140 (a)
Ralph T. Wilson	Cecil	Poland-China	10	1873 (b)
E. Earl Remsberg	Frederick	D. J. x P. C.	10	1789
Chas. Ellwanger	Caroline	Poland-China	11	1704 (c)
C. Claude Cissel	Howard	D. J. x P. C.	13	1705
Robert Moore	Montgomery	Berk x D. J.	11	1577
Ira C. Doub	Washington	Poland-China	11	1570
O. E. Yerkey	Kent	D. J. x P. C.	10 (d)	1516 (e)

(a) 2161.5 lbs., 151 days; (b) 1911 lbs., 152 days; (c) 1721 lbs., 151 days; (d) 1 pig lost at about 100 lbs., leaving 9; (e) 1486 lbs., 148 days.

State Cup Winners in Maryland Litter Contest

Year	Name	No. of Pigs	Age Days	Wt. Pounds
1925	Charles F. Hines	9	150	1612.5
1926	G. Carlton Oland	12	150	2423
1927	G. Carlton Oland	10	150	2093
1928	Stanley P. Stabler	10	151	1795
1929	J. S. & E. T. Cullen	13	151	2161.5

STATE AND CECIL COUNTY

First Prize Litter Report.

BY E. T. CULLEN

Mr. President, fellow members, breeders, and, as the past hour has thoroughly proved, fellow feeders:

I appreciate this cup, and I hope the swine growers of Maryland appreciate what the sponsors of this trophy are doing for the pork industry in Maryland. This is the first time the cup has come to Cecil County, and I am sure Mr. Wilson and Mr. Balderston are going to see that it stays at home in 1930. I want to commend the Schluderberg-Kurdle Company for their generous support of this movement, and to take this opportunity to thank them for the courtesy extended to us while marketing this litter and our other pork.

Litter and Feed Record

Ray of Hope 2nd No. 393276, the dam of the litter, was bred to Buster Hawk on November 15, 1928. She had the run of bluegrass pasture lot all winter. She was self fed a ration consisting of 300 lbs. corn, 300 lbs. wheat, 300 lbs. oats, 200 lbs. clover hay, 50 lbs. fishmeal, 50 lbs. oil meal, 15 lbs. salt. On March 2, 1929 she farrowed 13 pigs, 5 boars and 8 gilts. On March 9, they were put on bluegrass pasture and a grain ration made up of 300 lbs. corn, 300 lbs. wheat, 300 lbs. oats, 100 lbs. fishmeal, 15 lbs. salt. During April they also received 1,000 lbs. of surplus milk. On May 1 the sow and litter were given access to oat-and-rape pasture in addition to the bluegrass. During July the litter received 10 lbs. of molasses daily in slop, after it had fermented.

Approximate Feed Cost

2100 lbs.	corn	$37.50
2100 lbs.	wheat	38.50
2100 lbs.	oats	32.75
700 lbs.	fishmeal	29.75
300 lbs.	molasses	4.50
100 lbs.	salt	1.50
1000 lbs.	milk	23.30
17300 lbs.	grinding	25.95
		$198.75

Receipts

216½ lbs. hogs @ $12.15 plus 1½c. premium	295.04
Net returns above feed	$101.29

(In addition to prizes amounting to $125 in gold.)

I might add, that our herd boar, Buster Hawk, the sire of our litter is a son of the 1927 Grand Champion, Knight Hawk; and that the dam of the litter, Ray of Hope, is a daughter of the 1928 Grand Champion, New Hope.

The sire of Mr. Wilson's litter, our junior herd boar, Hope Zi, is out of Ray of Hope, the Dam of our litter, and is a half brother to the 1929 Grand Champion, he being sired by Zi Zi, twice Grand Champion of Ohio.

You can see by the breeding that Cecil County's two litters are not a result of chance, but are an evidence of good blood breeding.

In conclusion, our success with this litter is due to:

First, to ideal weather and farrowing conditions. All of March was warm and sunny, so that the pigs got away to a good start.

Second, good equipment, warm, dry, inexpensive houses and the use of self feeders.

Third, good breeding, that is purebred animals of good type and conformation.

Fourth, plenty of good pasture, water, shade and a well balanced ration. I think the surplus milk really made the litter, as April was wet and cold.

I again wish to express my appreciation of this cup.

STATE SECOND PRIZE LITTER REPORT

BY RALPH T. WILSON, Cecil County

Mr. Chairman and Gentlemen:

First, I want to express my thanks to the Schluderberg-Kurdle Company who contributed this prize. I value this prize not only for its monetary value and the honor it carries, but because I was able to do my bit in helping put Cecil County on the hog map of Maryland.

Last May when Mr. Bartilson, our County Agent, signed me, he explained the various prizes. He said, County prize $25, second and third State prize, $75, and $50 each. I asked, "Isn't there a first State prize?" "Yes," he said, "but that always goes to Montgomery County. That is understood."

This litter of pigs was born March 10, 1929, eleven pigs in the litter, but unfortunately one passed out the first night. The mother is a grade Poland-China, and she was bred to a purebred Poland-China boar. Before farrowing time I fed the sow a 20% commercial feed with some corn to keep up her flesh. At farrowing time I gave some steamed bran. When the pigs were about 5 weeks old, I started feeding them some commercial feed with ground oats and corn. I weaned them at about 8 or 9 weeks continuing the same feed along with some semi-solid buttermilk diluted with water. The buttermilk lasted till nearly July. I tried to keep the 20% feed down to a minimum, starting about equal parts of commercial feed and a mixture made up of corn and oats 3 to 1, ground fine as I could get the miller to grind it. I gradually increased the quantity of corn and oats until at last the commercial feed did not comprise more than 1/5 to 1/6 of the ration. My corn ran short in July, so I bought hominy meal. I found that mighty good for the hogs but hard on the pocket book. At first I fed 3 times a day but as harvest came on I fed but twice giving them all they would clean up in 3 or 4 hours.

These pigs had the run of an old orchard of an acre or 1¼ acres. Hogs have been on it every year for 40

years or more. My hog house is at one corner, where I kept the feed and fed them. A creek runs through one end and believe me James Whitcomb Riley's "Old Swimming Hole" never had anything on this creek for these hogs. They simply stayed in the water during the hot weather except when feeding. To that creek I attribute no little of whatever credit is due me, for the pigs kept right up on full feed during the hot, dry weather.

I will admit I did not keep as careful a feed record as I should. The following may deviate a little from the actual feed consumption.

1100 lbs. 20% commercial feed @ $3.30 per cwt.	$36.30
2300 lbs. oats and corn @ $2.15	47.30
1300 lbs. hominy @ $2.35	30.05
50 lbs. salt	.50
130 lbs. buttermilk @ 5½c.	7.15
Pasture	25.00
	$146.30

Making a total feed cost of $146.30, exclusive of what the sow ate, for 1,873 pounds of pork in 150 days making cost about $7.50 per hundred.

They received their feed dry except when I fed the buttermilk. I fed no so called mineral mixtures or condition powders but they did receive wood ashes from the kitchen stove.

I did not receive a bonus as did Mr. Cullen, but the market around August 7 was about $12.50 per hundred.

1873 lbs. pork @ $12.50	$234.13
State prize	75.00
	309.13
Subtracting feed cost	146.30
Profit	162.83

There are several lessons that can be learned from these contests. First, unless you have good stock, you need not start. You have to give them the right environment, as pasture, shade and water for hot weather. Also, it is important to provide the right feed or combination of feeds. Last but not least, March or April pigs can be put on the market early in the fall before the big run of

hogs comes. Locally, our best market is about September 15 to November 1 with the home butcher.

STATE THIRD PRIZE AND FREDERICK COUNTY FIRST PRIZE LITTER REPORT

BY E. EARL REMSBERG

Mr. Chairman and Gentlemen:

These pigs were a cross between Duroc-Jersey and Poland-China and were farrowed on April 22, 1929.

After the farrowing pen had been thoroughly cleaned, it was placed in a half-acre pasture lot of clover. Practically all of the pasture was consumed by the time the pigs were eight weeks old and from this time until the end of the feeding period they were dry-lot fed. The only shelter provided was the farrowing house, which was insufficient during hot weather.

When the pigs reached the age of three weeks a creep was made, and they were given all of the skimmilk with a little middlings in it, and all of the shelled corn they could consume. By using this method of feeding the pigs and reducing the sow's ration, the pigs had weaned themselves at the age of seven weeks and were then given access to a self feeder until they were marketed at the age of eight weeks, the skimmilk and middlings were dropped from the ration, and from then on until the end of the feeding period they received only shelled corn and tankage. At one time I put some barley in the feeder, but the pigs did not seem to care for it, so it was discontinued.

A sixty-gallon hog waterer was used, and it was filled every third day.

The kinds and amounts of feed used are as follows: Corn, 70 bus.; tankage, 300 lbs.; middlings, 500 lbs.; barley, 100 lbs.; oats, 60 lbs.; skimmilk, 50 gals. Total cost of feeds, $100.30. The amount of feed consumed included all feed fed from date of farrowing until end of 150 days.

They were sold at 180 days for $11.00 per hundred pounds and would have brought the same price at 150

days. Received from Frederick County Fair Association, as premiums $25.80, and from the Schluderberg-Kurdle Company, the third State prize of $50.00 and the Frederick County first prize for $25.00, making a total of $75.00.

HOWARD COUNTY FIRST PRIZE LITTER REPORT

BY C. CLAUDE CISSEL

This litter of 13 pigs was out of a grade Poland-China sow and sired by a purebred Duroc boar. The shelter consisted of an open shelter facing south, made of rough boards, with composition roof. The litter had access to an orchard of about 1½ acres and secured green feed from no other source. Shelled corn and meat meal were self-fed. Baking refuse, including sweepings, dough, cake crumbs and some stale bread, was fed wet. Water was supplied in a trough. At weaning time the pigs were penned without feed for 24 hours and then given treatment for worms.

Twelve of the hogs were sold at auction at the Baltimore Livestock Exposition; they brought 16½ cents per pound,—a little over $274 after selling expenses were deducted. One small pig was kept at home and dressed 120 pounds in December, credited at 12 cents per pound. The Howard County first prize was $25.00 in gold. In all, the returns from the litter amounted to about $313.50.

CAROLINE COUNTY FIRST PRIZE LITTER REPORT

BY CHARLES L. ELLWANGER

This litter of 13 "big type" Poland-China pigs farrowed March 16. Eleven pigs survived after the first two or three days. At five weeks of age the sow and pigs were moved to about one-half an acre of fine red clover pasture. At seven weeks the pigs were eating out of a self feeder, but the sow could not get to this. They were weaned at 10 weeks of age. For shelter I fixed a straw shed.

These pigs consumed 2,600 pounds of hog-feed, mixed by the Farmers Supply Company of Denton; 50 pounds of tankage; and 20 bushels of corn on the cob. This includes what feed the sow and litter ate. I mixed the extra 50 pounds of tankage in the last three weeks while I was feeding the greatest amount of corn. Water was before them at all times in an open trough.

Cost of Litter at 150 Days

2600 lbs. hog feed @ $2.50	$65.00
50 lbs. tankage	2.25
20 bu. corn @ $1.00	20.00
Total cost of feed	$87.25

These pigs were sold to a local butcher a few days under six months at 18 cents a pound.

Average sale price	$ 27.77
Total sale price	305.50
County prize	25.00
Total returns	$330.50
Pigs consumed after contest feed about $ 45.00	
Total Cost of all feed	132.25
Total returns	$330.50
Total cost of all feed	132.25
Gain	$198.25

STATEMENT FROM MONTGOMERY COUNTY FIRST PRIZE WINNER

BY ROBERT R. MOORE

I appreciate very fully the good that the Maryland Stockmen's Association is doing in offering these 1500-pound litter prizes. No one can feed out a litter without gaining very valuable information on feeding, and also gaining a very great respect for the persons who have been so successful in this work in the past.

Three of the most important factors for the success with a litter would be: first, a large well-bred litter; second, a proper and well-balanced ration; and, third, treatment to assure freedom from worms.

REPORT OF WASHINGTON COUNTY FIRST PRIZE LITTER
BY IRA C. DOUB

This litter of 10 purebred Poland-China pigs was raised by a two-year-old sow that farrowed 12 pigs on March 1. On the first day after farrowing the sow was given only water; the second day she received some middlings, whole oats and pig meal, with skim milk in the form of slop. These feeds were continued until the pigs were weaned, at 9 weeks of age.

After the pigs were weaned they were put into a pen by themselves and self-fed on 18 per cent pig meal with skim milk accessible at all times. After the pigs were three months old, ground corn, oats, middlings, tankage and salt were fed three times daily, in the form of a slop and pig meal was fed dry in the feeder. The pigs were allowed to have access to a field for an hour or more during the evening. The total cost of feeds and labor to 150 days, at which time the pigs weighed 1,570 pounds, was estimated at $94.97.

REPORT OF FIRST PRIZE KENT COUNTY LITTER
BY O. E. YERKEY

I used my regular plan of raising hogs for market and entered the Contest to check up on my hog raising. In the first place, I had my sow in good condition. She was wintered on soybean hay, corn, and a mineral mixture (1 part salt; 3 parts ground limestone; 3 parts 16% acid phosphate). Toward farrowing time I changed feed gradually to wheat bran with a little fishmeal and moved the sow to a field of mammoth clover with very crude shelter of straw poles and an old garage door. She was fed wheat bran slop for a few days before farrowing and was fed nothing for 24 hours after farrowing. The sow was gradually brought back on feed and corn was added to her feed in 8 to 10 days. A creep was built out of 3 gates and the regular field fence on one side. Shelled corn and middlings were fed separately in troughs. Running water was accessible in the field until the drouth

became severe. I did not wean the pigs, I never do but I gave the sow all she would eat while the pigs were with her. The sow came in heat and was bred when the pigs were about 6 weeks old. She did not wean the pigs until they were 9 or 10 weeks old. I later put 3 more sows and pigs in the same clover field, 2 litters being much younger. The cost of feed is estimated on this account. Troughs were kept full of middlings and a fair feed of corn was supplied once daily. About 1/4 lb. fishmeal per pig was fed 3 times per week. The mineral mixture was kept before the pigs all the time. The clover was cut for hay and it yielded a full crop; but pasturing seemed to make it mature later. No charge for pasture is made in estimating the cost of the pigs.

One pig was lost at about 100 pounds, leaving 9 in the litter. The four litters were sold to a local butcher at 13 cents per pound on the farm. He took them as needed for slaughter, and the figures given are based on the weights at 150 days. When the litter was about 140 days old, cholera broke out on the next farm. The pigs were treated, as advised by County Agent McVean which cost about $1.00 each.

Estimated cost of feed for pigs and sow:

2700 lbs. middlings @ $2.25*	$ 60.75
40 bu. corn @ 90 c.	36.00
225 lbs. fishmeal @ 4c.	9.00
Bran	2.50
Mineral mixture	1.80
Serum and treating	8.10
	$118.15

*Middlings slightly damaged in mill run, milled locally.

Income figured on weights at 150 days live weight.

1516 lbs. @ 13c.	$197.08
County prize	25.00
Total income	$222.08
Total cost	118.15
Profit	$103.93

The litter should have had slightly better shelter; better facilities for water should have been provided after drought became severe; more corn in daily feeding should

have been fed; and fishmeal or tankage should have been fed every day.

The following Committees were appointed by President Harvey, with the request that the Auditing and Nominating Committees be ready to report at the morning session.

Fair Committee: Mr. Hobart Hutton, Montgomery County; Mr. E. D. Stotelmyer, Washington County; and Mr. K. A. Clark, University of Maryland Extension Service.

Auditing Committee: Mr. Stanley Stabler, Montgomery County; Mr. R. C. F. Weagly, Washington County; and Senator H. D. Wolfe, Howard County.

Nominating Committee: Mr. W. S. Chichester, Prince George's County; Mr. W. H. Cunningham, Washington County; Mr. J. C. Dalton, Baltimore County.

ADJOURNMENT.

THIRD SESSION

Lord Baltimore Hotel

Thursday, January 9, 1930.

The third session was called to order Thursday morning, January 9, at the Lord Baltimore Hotel by President Harvey.

President Harvey introduced Mr. K. F. Warner of United States Department of Agriculture who delivered an interesting address, which was well illustrated by suitable carcasses and cuts of meat.

CAUSES OF VARIATION IN CARCASS QUALITY

BY K. F. WARNER

In Charge, Meat Investigations,
Bureau of Animal Industry,
United States Department of Agriculture.

Mr. President and Gentlemen:

The title assigned me by your Committee, "Causes of Variation in Carcass Quality," would appear to be quite

specific. In reality, however, it has a broad application and it is hoped that you will bear with me, if I appear to digress a little.

One often sees or hears references to "the business man and the farmer." Although such phrasing is very natural, the distinction that is implied is most erroneous. No matter how poor a business man a farmer may be, he is still a business man and is subject to the same trials and necessities as the city operator. In the first place, he must produce something that the consumer wants. Secondly, he must produce it economically. Lastly, he must sell it to the consumer.

In some respects the business problems of the farmer, particularly the stockman, are less complex than those of the city man. For example, the farmer knows what the consumer wants. He can tell, within certain limits, the weight, tenderness, juiciness, and flavor of retail meat cuts that will sell best on the market. The same situation does not always prevail in other lines of business. The amusement world, for instance, can put their best thought and energy into a production but they can never know until opening night whether the result will be merchantable.

In the production field the man who operates a factory in the city has a decided advantage over the farmer. Although he has his troubles, he is not usually the victim of so many uncontrollable factors. Variations in rainfall, temperature, soil, disease, and parasites make it difficult for a farmer to predict either his production cost or the total production of either his farm or the country at large. This complexity of production problems, however, takes nothing from the need or desirability of solving them. The very fact that such things as temperature and rainfall cannot be controlled intensifies the need for understanding the influences of feeding and management practices—the things that the stockmen can control.

It was with this idea in mind that some 30 State agricultural experiment stations, the National Livestock

and Meat Board, the Institute of American Meat Packers, and three bureaus of the Department of Agriculture pooled their resources in an effort to understand more fully the effect of various breeding, feeding and management methods upon the amount and quality, or consumer value, of the meat that these methods produce. Each stockman is confronted by conditions more or less peculiar to his locality. Only certain feeds can be grown profitably in his section or bought at an economical figure. Certain kinds of livestock do better than other kinds. Sound management practice dictates the employment of definite feeding or grazing systems. In short, stockmen are faced with a certain number of available feeds and certain existing conditions. It is their problem to produce the greatest possible market value and profit from the things at hand.

This idea is the germ behind all the projects that have been developed in our meat investigations. Should the man with plenty of pasture feed grain to mature steers while on grass? Does the same thing apply to two-year-olds and yearlings? Does increasing finish improve the character and palatability of meat, or is there a point at which further finish adds to the cost to both producer and consumer without resulting in an adequate return? At what age and in what condition should the owner of plainly-bred or dairy-bred cattle sell his surplus for meat? What breed of sheep or type of hog is best adapted to the Corn Belt, to the South, and to the range country? These are all business problems that must be faced by every man who owns and operates a livestock factory.

This particular type of research is of comparatively recent origin, and the first results are just becoming available. The very nature of these projects, however, emphasizes the decisions that must be made by every stockman. His aim is the economical production of meat that will find favor on the market. The problem must be studied from the standpoint of breeding, type, age, sex, amount of finish, and the like. Those are the factors

that influence the weight, appearance, palatability,—in short, the market value of his product.

Planning the program for any factory, be it rural or urban, necessitates an understanding of both production and selling problems and the selection of the happiest combination of the two. The stockman must know not only the causes of variation in carcass quality, but also the causes of variation in production costs. It is a big assignment. Few, if any, operators in the city are confronted with such a difficult task.

Those engaged in the meat research lines hope and believe that the facts developed will be of use to you. All are sure that your experience and comments will be of use to us. We, in the Department of Agriculture, value most highly our contacts with such men as Mr. Carmichael and Mr. Hunt of your University of Maryland. They are partners with us in the laboratory. They are also partners with you on the farm. Through them and men like them in other experiment stations, it is possible for us to keep informed upon conditions prevailing in all sections of the country. This permits adapting our program to include a study of the variations in carcass quality that have the most important bearing upon your business.

Before closing, one more cause of variation in meat quality must be mentioned. I refer to the effect of various cooking methods upon the palatability of meat. One of the jobs of the stockman, as a business man, is to sell his product. To be a good salesman, he must be sure that the consumer will be satisfied and come back for more. Now there are almost as many different kinds of cooks as there are kinds and cuts of meat. It is really no easy task to place the right cut in the right kitchen, to be sure that Swiss steaks are not ruined in the broiler or pot roast boiled to pieces. We often think of cooking as a woman's job. Perhaps it is, but it is so closely connected with the selling problems of the livestock and meat industry that we all must interest ourselves in see-

ing that our customers, the consumers, obtain value and satisfaction from our products.

We do have one advantage. Almost any cut or quality of meat can be made into a palatable and nutritious dish, if properly prepared. The Home Economics Department of your own Agricultural College, of the Department, and of Agricultural Colleges the country over are bending every effort to develop the cooking methods most suitable for all the various cuts. They are salesmen too, our salesmen, and we will want to help them all we can.

To produce what the market wants, to produce it economically, and to sell it to the consumer in such a manner that he will be satisfied are the problems of all livestock men. I am sure that efforts toward their solution will be well rewarded.

President Harvey then introduced Mr. W. K. Freiert of the Schluderberg-Kurdle Company, Baltimore, who, substituting for Mr. W. F. Schluderberg, addressed the Association as follows:

BALTIMORE PREFERENCES IN WEIGHT AND TYPE OF MARKET HOGS

BY MR. W. K. FREIERT

Director Public Relations Division, The Wm. Schluderberg-T. J. Kurdle Company. Substituting for Mr. W. F. Schluderberg.

Mr. President and Gentlemen:

In discussing the subject which has been assigned to me, it must be recognized that the observations made may be construed as an individual opinion, and not entirely representative of the desires or preferences of the packing industry of Baltimore as a whole. My reason for saying this is because there are several pork packers in Baltimore whose operations are confined in the great majority to local consumption outlets and whose interests,

so far as the buying of live hogs is concerned, center about the problem of securing the weight or type of hog that will supply the sizes and kinds of pork cuts most desired by the local trade.

I have often thought that if the livestock producer would attempt to breed and raise a hog that would produce the sizes of products seemingly preferred by the Baltimore consuming trade, his finished product would indeed, be rather grotesque. By this I mean that a study of consumer preferences would indicate that hams, bacon, and pork loins of about six to eight pound average and shoulders weighing about three to five pounds are desired while in the purchase of faces, heads, or feet, and other products, they want the largest sizes that would be obtained from the heaviest hogs grown, and we all know that in buying hogs that will supply the choicest cuts of the desired size, we must be satisfied to accept the other products in proportionate sizes.

I believe, however, that it is generally accepted that hogs in the range between one hundred and twenty and two hundred pounds will always find a ready market in the Baltimore Stock Yards. Hogs with this weight range will produce the sizes of the more desirable cuts that have an outlet in Baltimore consuming trade. This observation is not intended to discourage the hog raiser who, because of an advantage he may have in the matter of being in a more favorable position so far as feed is concerned, may desire to continue to feed his hogs to heavier weights. He, too, will experience little difficulty in disposing of his stock, provided, of course, they carry quality as well as weight.

So far as the conformation of the hogs is concerned, those built to produce short plump hams, short thick shoulders, short rib meaty pork loins, and reasonably lean breasts are preferred. And, it seems, the most essential qualification is that the product be particularly lean. The elimination of excess fat, without the loss of quality in hogs, is one of the major problems confronting the hog raiser today. Consumer buying habits are con-

stantly changing, and the present tendency seems to be directed to the buying of pork products with as little fat or waste as is possible. This has resulted in it being necessary for the packer to trim his pork products more closely with a resultant increase in the product of his lard kettles.

It is a generally accepted fact that for several years past the lard kettle has been the packers "bugaboo", and his hopes of reducing losses already experienced in the operation of his lard department can be fulfilled only by a decrease in the yield of lard from the hogs he slaughters, so that his production will more equally balance the export and domestic demand for this product. Naturally, losses incurred in the slaughtering of hogs or in the manufacture of pork products will be reflected in the price the packer is able to pay for the livestock; so the conclusion may be drawn that the leaner the hog, the better the yield of the more desirable cuts, and the better price can be paid to the producer for his livestock. Incidentally, and I hope you will pardon any evidence of a sales talk being injected into this discussion, it must be admitted that lard substitutes have made heavy inroads into the sale of pure lard, and it is often noticeable that this is equally as true in the rural sections as it is in the urban sections. Why this condition should exist in rural sections is hard to understand, as it should be recognized that the farmer or producer can materially help his own conditions by purchasing his proportionate share of his own products in their finished form. Of course, as I said before, leaner hogs will help to solve this problem with resultant benefits to all concerned.

Speaking for the Schluderberg-Kurdle Company, while we are interested in securing hogs in the Baltimore market that will produce the desired pork products, we are primarily interested in a greater development of the livestock industry in Maryland. This, I think, was evidenced by the fact that we sponsored the Maryland Litter Contest during the past year, and I want to assure you that it was a genuine pleasure to be able to partici-

pate in the awarding of the gold prizes to the winners at the dinner-meeting held last night. Our only regret was that there were not more participants in this Contest. The successful ones in the Contest, I am sure, are satisfied that hog raising can be profitably carried on in the State of Maryland and with utmost satisfaction in this line of endeavor.

Our interest in this Contest was developed by two chief factors. First, in the analysis of our activities we found that, for the most part, our purchases of livestock were made outside of Maryland in the principal markets of the West,—not because we did not want to buy more liberally in our local market but because the desired stock was not available. Second, we are a Maryland concern, organized, developed, owned, and operated by Marylanders, and naturally we are interested in furthering the interests of the State and community in which we are so well and favorably established. Through his activities as a member of the State Survey Commission, Mr. Schluderberg learned many facts that convinced him that, because of its geographical location, its favorable climatic conditions, and its close proximity to the large consuming centers, Maryland offered many opportunities for the successful raising of feed, the profitable breeding and raising of livestock and an assured market for the sale of this livestock through the Baltimore Stock Yards and Baltimore packers.

And so, to encourage the farmers of Maryland in this particular line of endeavor, our interest was manifested in the Maryland Litter Contest by the offering of cash prizes to be distributed in accordance with the rules prescribed by the University of Maryland Extension Service and the Maryland Stockmen's Association. To the successful ones go our thanks and appreciation for the interest they displayed in this Contest and for the effort they made in demonstrating to their fellow-farmers of Maryland that hogs can successfully and profitably be raised and marketed in Maryland. To those who did not enter this Contest or have been reluctant about entering this branch

of the farming industry, we recommend the old adage, "Nothing ventured, nothing gained."

We feel, however, that four facts stand out prominently as a result of this Contest. First, a good strain of stock is essential for breeding purposes; second, proper food and shelter must be provided; third, stock must be ready for market when prices are most favorable; and fourth, the livestock industry affords many opportunities that many farmers have not yet recognized. And I would like to add the suggestion made by Dr. Bomberger at last night's meeting, that you become better acquainted with the packers, who are really only a link in the great chain from producer to consumer, ascertain from them the peculiar or otherwise requirements of the consumer and then endeavor to produce the type of live stock most essential to satisfy these requirements, keeping in mind that quality above all must be the first consideration; and the results, I am sure, will not only be beneficial to all concerned, but beyond anything that our fondest hopes may anticipate.

PRESIDENT HARVEY: In the absence of Mr. Armin Jaeger of Baltimore, whom we had expected to have with us today, I shall ask Professor Hunt to say a few words on the Baltimore Preferences for Beef Cattle.

BALTIMORE BEEF TRADE REQUIREMENTS

BY W. E. HUNT, College Park, Maryland

Mr. Chairman and Gentlemen:

In the absence of Mr. Jaeger, the chairman has asked me to discuss with you the "Baltimore Beef Trade Requirements," with special regard to size and quality of carcasses which best satisfy present demands. The theme of all of the Maryland Stockmen's Association meetings this year, seems to be "meet the demands of the consumer." So far as Baltimore beef trade is concerned, the situation is no different than that already presented in discussing demands for other kinds of meat. The consumer prefers cuts such as are obtained from

light-weight animals of good quality and finish. Carcasses from cattle weighing under 1,000 pounds, rather than from cattle weighing over 1,000 pounds receive the strongest call from the trade. Other speakers have outlined the reasons for such preferences on the part of the consumer.

In the production of beef cattle in Maryland, it is well to keep in mind the fact that carcasses from light cattle are much more readily merchandised than carcasses from heavy cattle. Still, we cannot overlook the fact that not all producers are so situated, especially with respect to feeds available and skill in feeding and management, that they can produce the type of cattle which represents the bulk of the demand and usually sells for the highest prices. We must not lose sight of the fact that the primary purpose of livestock on the farm is to convert products unfit or not wanted for human consumption into highly palatable, nutritious, and salable products. The production scheme has to be tempered by the farm feeds available. Not all beef producers have feeds of the kind and quality essential for successful production of light cattle. Such producers, even though they are not following the practice of satisfying the varying whims of the consumer, (many of which are not necessarily profitable from the producers' standpoint) have no other choice than to continue to make as much beef as they can as economically as possible from the feeds they have available. While there is no getting around the fact that light cattle are more merchantable, it is also true that not all producers can supply the market with prime and choice baby beeves and not all consumers are able to or want to purchase prime and choice light beef. It seems to me that there is an opportunity for progressive packers and retailers to improve their methods of merchandising heavy carcasses. Many of you are familiar with the work which the National Livestock and Meat Board, through Mr. Hartzell, has been doing in making lamb cuts more useful and attractive. Recently Mr. Hartzell has been set to work improving the methods of breaking

up beef carcasses, I believe this is a logical step and that his results will be of material assistance in overcoming the disadvantages of heavy cattle in the retail trade. Packers and retailers have an obligation in this respect which we should not overlook, and they can do much to benefit all interests.

The thoughts here presented should not be considered as an attempt to offer an excuse for failure of producers who have, or could readily have, feeds of the kind and quality necessary for the production of light cattle, failing to take advantage of their opportunity. Those who can produce light cattle economically should by all means, under present trade conditions, attempt to produce the cattle which are in such popular and profitable demand. We should not, however, lose sight of the fact that there are some conditions under which heavy cattle are more desirable from the producers' standpoint, and a profitable place should be found for them in the retail trade. Perhaps a good deal of the coarse roughages which are now being fed to plain, heavy cattle in this state, could profitably be fed to beef cows, and the grain now fed to a large number of heavy cattle used to finish the calves from these cows. This would supply more of the light beef, which is in popular demand and would place the production of heavy cattle chiefly in the hands of those who are able to produce them most economically. While packers and retailers can handle four light carcasses to one heavy carcass with more profit all around, I feel that we still owe an obligation to the man who is so situated that he can not economically take advantage of the popular demand for light cattle.

PRESIDENT HARVEY: As our time is passing, we shall hasten on. Dr. I. K. Atherton, of College Park, will present a report of hog cholera work in Maryland during 1929.

HOG CHOLERA RESULTS IN MARYLAND IN 1929

BY I.K. ATHERTON

Inspector in Charge Hog Cholera Work and Farm Sanitation, College Park, Maryland.

Mr. Chairman and Gentlemen:

At this period of the year we find partners and stockholders of business and financial institutions listening to and carefully scanning reports for the year just ended. This is especially true of those institutions which were made financial foot-balls last fall by Wall Street operators. While the slump in stocks in no way influences the hog cholera situation in Maryland it is fitting at this time that I should make my annual report to this organization.

It is hoped that the amalgamation of the several organizations to form the Maryland Stockmen's Association will not lead to a disregard of the progress of the Maryland Plan for the Prevention of Hog Cholera. Although 97 years have elapsed since hog cholera made its appearance among the swine herds of Ohio, Maryland is the only State in the Union that is making any systematic effort to prevent the introduction, harboring, and spread of the hog cholera infection. In fact, it is the only State in which practically all outbreaks of cholera are investigated and the data relative to them is compiled and made public. While it is true that we have no definite information regarding the disease from other states, with which to compare that collected in Maryland, yet I believe it is the duty of this organization carefully to watch the results of this work in Maryland as shown by the annual reports made at the yearly meetings.

The hog cholera situation in Maryland for 1929 was very satisfactory. Only 334 outbreaks were reported against 938 in 1928 and a ten-year annual average of 588. With the exception of the year 1925, when only 321 outbreaks were reported, this was the lowest number of outbreaks that has been recorded in any one year since the work was inaugurated in Maryland. In one par-

ticular the results in 1929 were better than in 1925 for there were fewer outbreaks reported on farms where hogs are bred and raised.

The small number of outbreaks reported in 1929 was really in the nature of a surprise on account of the large amount of hog cholera which existed in Maryland as well as in the Middle West during 1928. There is no doubt but that an unusual amount of infected pork went into cure during the fall and winter packing season, and, following such years, it has been the history of the disease in Maryland that the number of outbreaks have always run above the average for the first nine months of the succeeding year. It is, of course, probable that, because of the large number of premises on which the disease appeared in Maryland in 1928, swine growers were more cautious, and that more care was used relative to feeding garbage, table scraps, and kitchen swill that might have contained infected pork.

An analysis of the outbreaks reported during the year is not only interesting but demonstrates that the outbreaks are largely due to disregard of the Maryland Plan for the Prevention of Hog Cholera.

Of the 334 outbreaks reported during the year 304 were primary or new centers of the infection. Only 30 or less than 10% were secondary or due to the spread of the infection from nearby premises. Moreover, in practically every instance, as has always been the history of the disease in Maryland, the infection had been spread and the secondary outbreaks occurred before the primary or new outbreaks were reported.

Two hundred seventy-seven, or 91%, of the new outbreaks of cholera were apparently due to infected pork in garbage, table scraps, kitchen swill, etc. In fact, if the data could be obtained they would probably demonstrate that practically every outbreak of the disease in Maryland during 1929 was directly or indirectly due to the feeding of infected pork. Twenty-two were due to the purchase of infected hogs; one to the abuse of the double treatment, while 2 cases were caused by departing ten-

ants leaving unburied carcasses for the hogs which were brought by the new occupants of the place to come in contact with. In 2 cases the owners could not or would not give any information on which to base the source of the trouble. In this connection, much information was obtained during the year relative to the sources of infection in new outbreaks of cholera in the Corn Belt. From questionnaire replies received from 199 veterinarians it was shown that the introduction of new stock was the leading factor, with the double treatment a close second, while infected pork in garbage, etc., was a good third.

Sixteen of the 30 secondary outbreaks were due to permitting sick or well hogs to run at large and to the movement of such animals from farm to farm. Thirteen were due to a combination of unburied carcasses and loose hogs or dogs. One was due to the movement of a drag from a hog lot where the animals were sick to other premises on which well hogs were confined.

The real importance of the outbreaks reported depends largely on whether they occurred on farms where hogs are bred and raised, for this is where the disease means the most to the swine industry. In this connection it is interesting to note that 208 of the outbreaks reported during the year were of the backyard type, while only 126 occurred on farms where hogs are bred and raised. This is estimated to be not more than .4 of 1% of such farms in Maryland. Moreover, on 11 of these farms garbage-feeding plants were maintained. In fact, 44 of the 334 outbreaks reported were in garbage-feeding plants. It is also interesting to note that 27% of all hogs involved in the outbreaks reported during the year were in garbage-feeding plants. In approximately 40% of the outbreaks reported during the year only 5 hogs or less were involved.

Questionnaire replies giving the loss in 322 outbreaks were received, while estimate was made on the losses in the remaining 12 herds. These data show that 2,648 hogs, or an average of approximately 7.8 per outbreak, were lost. However, 539, or 20%, of these losses were in

garbage-feeding plants. It has been the custom to add 20% to the losses sustained in the outbreaks reported in order that conservatism could be claimed in the estimates made. Twenty per cent of the losses sustained in the outbreaks reported would be 457 hogs which would make a total loss of 3,105 hogs from cholera in Maryland in 1929. This is approximately only 15 hogs per thousand, according to the number estimated in Maryland on January 1, 1929.

The following table gives the outbreaks by counties compared with a ten-year average and shows the percentage of Maryland's hogs in each county.

County	Outbreaks Reported in 1929	Ten-Year Average	Distribution of Maryland Hogs Per Cent
Anne Arundel	24	28.2	3.
Allegany	8	5.9	1.5
Baltimore	14	22.1	7.
Calvert	3	6.9	1.6
Caroline	12	10.7	2.7
Carroll	8	14.2	11.5
Cecil	18	22.8	3.9
Charles	14	12.6	3.4
Dorchester	13	39.2	2.2
Frederick	33	31.5	11.3
Garrett	0	.2	2.
Harford	4	14.2	5.2
Howard	20	11.1	4.
Kent	20	32.9	2.6
Montgomery	30	29.	7.1
Prince George's	32	28.6	4.5
Queen Anne's	18	19.3	4.2
St. Mary's	7	18.	3.3
Somerset	3	31.6	1.8
Talbot	4	34.6	2.9
Washington	25	83.6	10.
Wicomico	10	37.8	1.6
Worcester	14	53.3	2.5
Total	334	588.3	100.0

The double treatment was administered to 165 herds during the year. However, it was used on only 126 premises, and in 71 instances these were garbage-feeding plants. This shows that it was not used on more than .3 of 1% of the farms in Maryland. The results following the use of the treatment were investigated in 98 instances.

It was found that hogs sickened and there were losses as a result of the treatment in 16 cases. This is slightly more than 16% of the cases which were investigated. In practically none of these cases were official veterinarians given an opportunity to see the animals while they were sick, and, owing to difference of opinion relative to such cases, no diagnoses were made. However, it is believed that all were cholera.

Several years ago a certain double treatment enthusiast made a statement to the effect that Maryland was committed to a single treatment policy and would suffer for it sooner or later. In this connection it is well to state that Maryland is not committed to a single treatment policy, but, rather, is committed to the observance of the sanitary measures necessary to prevent the introduction, harboring, and spread of the infection. However, eight years have elapsed since the direful prophecy was made, and the swine raisers have not yet suffered for having failed to use the double treatment to protect their hogs from the disease. In fact, a seven-year annual average of outbreaks reported on farms where hogs are bred and raised has only been .7 of 1%. In contrast, during a seven-year period the "breaks" following the use of the double treatment in Maryland where the results have been investigated have averaged approximately 12%—seventeen times as large a proportion of outbreaks as were experienced in 1929 on those premises where the treatment was not used.

A year ago your attention was called to the losses sustained by the swine growers of the Middle West from contagious and infectious diseases other than hog cholera. This condition apparently is becoming a very serious matter, and, as reported by the Swine Disease Committee of the United States Livestock Sanitary Association in December, the "breaks", or sickness among swine following the use of the double treatment, are becoming more and more troublesome. Over 50% of the questionnaire replies received from veterinarians in the Middle West showed that other diseases of swine were causing heavier

losses than hog cholera. Necrotic and infectious enteritis, diseases which are practically unknown in Maryland, were causing the heaviest loss, while so-called "flu" and several other diseases were mentioned as being a menace. In Maryland we have only one infectious disease, hog cholera, which is of any note while the only other diseases of any moment are not of a contagious or infectious nature. I refer to digestive trouble and deficiency disease, the latter being due to lack of proper feed. If, as has been suggested, the extensive and continuous use of the virus is responsible for the presence of these alleged new diseases, Maryland can again be congratulated on the wise control of the double treatment and the adoption of sanitary measures as a means of hog cholera prevention.

PRESIDENT HARVEY: Those of you who attended the Baltimore Livestock Exhibition last October will remember the fine display of beef calves belonging to Club members. Professor K. A. Clark will now make a report on Beef Club work in Maryland, which was scheduled for last night's session, but which time did not permit him to give then.

BEEF CLUB WORK IN MARYLAND

BY K. A. CLARK, College Park, Maryland

The Maryland Beef Calf Club was started in 1927 with fifteen members. The second year of its existence, 1928, the membership was increased, and the number of calves increased to fifty-six head, some members owning more than one calf. During the past year, forty calves were fed by beef club members in this state. This is hardly as many as last year. The difficulty of getting the right quality of calves at a reasonable price is making it increasingly hard to supply the demand that is coming from the boys and girls. This year we could have had between 80 and 150 calves on feed had they been available at anything like a decent price.

The number of calves shown at the Baltimore Livestock Show was 35 head. This exhibit consisted of 24 Shorthorns, 7 Herefords and 4 Aberdeen-Angus. Five calves, for one reason or other, were not brought to the Baltimore Show and Sale.

Following is a brief report of this year's club work and following it is a summary of the three years' work:

1—Winnings of the Maryland Beef Calf Club Entries in the Show:

Shorthorn Class

1st Prize—John Fenwick, Glyndon, Maryland.
4th Prize—Arthur Brown, Glyndon, Maryland
5th Prize—Leon Leppo, Westminster, Maryland
7th Prize—Noah King, Gaithersburg, Maryland
8th Prize—Ralph DeHoff, Littlestown, Maryland.
11th Prize—David Bachtell, Smithsburg, Maryland.
12th Prize—Charles Bankert, Westminster, Maryland.

Hereford Class

2nd Prize—Fred Wintermoyer, Hagerstown, Maryland.
3rd Prize—John Randall, Clarksville, Maryland.
6th Prize—Audrey Knepper, Hagerstown, Maryland.
7th Prize—Ralph Seibert, Clearspring, Maryland.
8th Prize—Howard Hebb, Hagerstown, Maryland.
10th Prize—John Fenwick, Glyndon, Maryland.

Angus Class

6th Prize—Audrey Knepper, Hagerstown, Maryland.
9th Prize—Milton Moore, Jr. Hagerstown, Maryland
10th Prize—Edgar Zepp, Jr., Clarksville, Maryland.
12th Prize—Edgar Zepp, Jr., Clarksville, Maryland.

II—SALE REPORT OF THE MARYLAND BEEF CALF CLUB STEERS

Club Member	Address	Weight	Price	Total	Purchaser
Shorthorns					
Arthur Brown	Glyndon	940	$20.50	$192.70	Duffy Brothers
John Fenwick	Glyndon	990	25.00	247.50	J. H. Baugher
John Sterner	Gaithersburg	770	17.50	134.75	Myers & Houseman
Charles Bankert	Westminster	980	17.25	169.05	H. Browning
Harvey Bowersox	Westminster	1020	17.25	175.95	Jaeger Brothers
Bernard Dutterer	Westminster	1090	17.00	185.30	E. Heinz
Leon Leppo	Westminster	1140	17.50	199.50	Corkran-Hill
Ralph DeHoff	Littlestown	1020	16.75	170.85	Duffy Brothers
Luther Heltibridle	Westminster	840	14.50	121.80	Schluderberg-Kurdle
Paul Bowersox	Westminster	990	16.25	160.86	E. Berlett
Paul Bowman	Westminster	1100	17.25	189.75	M. E. Campbell
Noah King	Gaithersburg	870	17.75	154.43	Corkran-Hill
John Randall	Clarksville	1110	16.50	183.15	Corkran-Hill
Roger Seibert	Clearspring	950	16.75	159.13	Corkran-Hill
David Bachtell	Smithsburg	1120	17.25	193.20	Corkran-Hill
Milton Lowry	Breathedsville	1080	16.75	180.90	Corkran-Hill
Lewis Schnebley	Clearspring	1200	16.25	195.00	Schluderberg-Kurdle
Elbert Smith	Graceham	1140	16.75	190.95	Schluderberg-Kurdle
Ronald Itnyre	Smithsburg	1110	16.75	185.92	Corkran-Hill
Orville Ernst	Clearspring	1080	16.50	178.20	Corkran-Hill
Donald Lowry	Breathedsville	1130	16.25	183.63	Corkran-Hill
Ralph Seibert	Clearspring	1090	14.75	160.78	Schluderberg-Kurdle
James Davidson, Jr.	Bowie	970	15.25	147.93	Schluderberg-Kurdle
John Davidson	Bowie	780	15.25	118.95	Schluderberg-Kurdle
Herefords					
John Fenwick	Glyndon	1120	17.25	193.20	Duffy Brothers
John Randall	Clarksville	1020	25.00	255.00	E. Berlett
Howard Hebb	Hagerstown	1030	18.25	187.98	E. Heinz
Ralph Seibert	Clearspring	1090	17.50	190.75	Corkran-Hill
Fred Wintermoyer	Hagerstown	1010	30.00	303.00	Consolidated
Audrey Knepper	Hagerstown	940	17.50	164.50	E. Heinz
Russell Wolfinger	Hagerstown	1040	17.25	179.40	Corkran-Hill
Angus					
Edgar Zepp, Jr.	Clarksville	825	15.75	129.94	Corkran-Hill
Edgar Zepp, Jr.	Clarksville	825	15.75	129.94	Corkran-Hill
Milton Moore, Jr.	Hagerstown	780	16.75	130.65	
Audrey Knepper	Hagerstown	980	21.00	205.80	Duffy Brothers

SUMMARY STATISTICS MARYLAND BEEF CLUB—1929

	No. of Steers	Av. Wt. Lbs.	Av. Price Per 100 Lbs.	Av. Price Per Head	Total Wt. Lbs.	Total Returns
Angus	4	852	$17.31	$149.08	3,410	$ 596.33
Herefords	7	1035	20.39	210.55	7,250	1,473.83
Shorthorns	24	1021	17.06	174.17	24,510	4,180.19
All Steers	35	1005	17.75	178.58	35,170	6,250.35

III—SUMMARY OF THREE YEARS' BEEF CLUB WORK IN MARYLAND

1927

	No. of Steers	Av. Wt. Lbs.	Av. Price Per 100 Lbs.	Av. Price Per Head	Total Wt. Lbs.	Total Returns
Angus	5	880	$20.00	$176.00	4,400	$ 880.01
Herefords	5	850	22.74	193.32	4,250	966.61
Shorthorns	5	949	20.14	191.14	4,745	955.69
All Steers	15	893	20.92	186.82	13,395	2,802.31

1928

Angus	20	1,016	$18.19	$184 79	20,310	$3,695.88
Herefords	18	966	17.52	169.26	17,385	3,046.62
Shorthorns	10	916	15.72	143.95	9,155	1,439.47
All Steers	48	976	17.46	170.46	46,850	8,181.97

1929

Angus	4	852	$17.49	$149.08	3,410	$ 596.33
Herefords	7	1,035	20.33	210.55	7,250	1,473.83
Shorthorns	24	1,021	17.06	174.17	24,510	4,180.19
All Steers	35	1,005	17.77	178.58	35,170	6,250.35

All Years

Angus	29	970	$18.39	$178.35	28,120	$ 5,172.22
Herefords	30	963	19.00	182.90	28,885	5,487.06
Shorthorns	39	985	17.12	168.60	34,410	6,575.35
All Steers	98	974	18.06	175.86	95,415	17,234.63

The purpose of the beef calf club work in Maryland is to demonstrate the feeding and selling of choice baby beef cattle. This type of steer production is not common in Maryland. Most steers fattened are large, course, rough cattle. It is felt that this sort of cattle feeding should be largely discontinued and the light, handy-weight quality cattle raised and fed instead. Results of the Maryland Beef Calf Club work indicate the production of baby beef is possible and highly practicable under Maryland conditions. Many steer feeders have been quick to recognize this fact, and there are now on feed quite a number of choice feeder calves in our feedlots.

We try to give our boys other training as well as the feeding of calves. It is necessary for the boys to work together to obtain best results in this project, for only by close cooperation on the part of all the members is it possible to make the best sales. The expense of moving a calf or two to a boy's place or from his place to market is much higher than where all go together and defray this type of expense jointly. It is cooperation of this kind that will eventually be of great value to these young boys after they grow up. A high degree of patience and painstaking care is necessary to fatten one of these calves. I know of no project that develops these traits in a boy better than beef club work. Good cattle feeders have an unlimited supply of hard, steady nerve, as a rule. The feeding of expensive feeds to high priced cattle makes the beef cattle business very dependent on courage. Boys that go into this work know at the outset that it will require lots of care and will yield only a reasonable profit. For this reason, I think we attract a more conservative and steady type of boy to our ranks than other types of club work which may be more exciting or attractive. The boy that can carry on this work to the best advantage is one from 15 to 20 years of age. Younger boys cannot handle the steers and carry out our recommendations as effectively as the older group. Though boys do a lot of work in the beef club, they do other things too. We have a meeting every two or three months. Usually some-

time during the summer a tour and picnic is held in each county. At meetings of this kind we "talk cattle" and thresh out our problems in the best possible way, mixing with these things about the proper amount of fun. I find that beef club members are very much interested in their work, and it is no trouble to get them together or to hold their interest and attention while they are together. It is an inspiration to me to be privileged to work with this project. It is strictly commercial in its aspects, and, for that reason, it appeals to me as having distinct advantages over breeding projects. It is big enough to amount to something and yet not so expensive as to keep anyone out. The project is peculiar in that it does not interfere with anything else on the farm. The calf is simply kept and fed in a stall by himself. He requires no fence or additional building to be made.

We should aim to increase the number of club calves in Maryland each year. This can be done if all agencies will help toward this end. One of the biggest problems we have is in buying suitable calves. If some arrangement to finance this part of our project could be made, progress would be more rapid. The money would be needed for only 30 to 40 days to enable us to go out and purchase suitable calves in carlots and bring them in here for distribution. This is a worth while cause. It should appeal to packers and others interested in the Baltimore market as a means of promoting the production of more high class beef and, at the same time, should offer great encouragement to the future farmers and cattlemen of this State.

Discussion following Beef Calf Club summary by Professor Clark. (last session) Discussion:

MR. F. T. FIERY, Washington County: I believe that there is a good demand for young cattle and that there is an opportunity to maintain a beef breeding herd and to rear a few steers instead of buying feeders from other sources.

MR. JAS. DAVIDSON, Prince Georges County: It is important to have correct beef conformation in our beef

cattle. Any of the three beef breeds will do,—each has beaten the others in the various shows. The Angus, from a strict show standpoint perhaps excel, but we believe that from the general farmers' standpoint the Shorthorn is deserving of high favor. The milk which the young calf receives is important. Nurse cows are not so much needed by Shorthorns as by some other breeds.

MR. W. P. MAGRUDER, Prince Georges County: Much has been said about type—hogs, lambs and calves, and about increasing the prosperity of the livestock producers,—improving his financial status. This reminds me of the farmer who attempted to borrow some money at his local bank. The banker asked for security. The would-be borrower offered his crops, and his wife's and his neighbor's signatures. The banker would not agree. Said the applicant,—"we will never die without enough to pay you; if we live we'll be able to pay it. If we go to heaven we'll send it to you, if we go to the other place, we'll hand it to you."

Much land in Maryland is lying idle due to lack of funds and labor for its clearing, fertilizing and cultivation. Recently I purchased a neglected farm. The cost of clearing up this land was as much as the same area would cost to buy, 20 miles from Washington. It is important that these farms of Maryland be made to pay. Years ago I noticed the change from the large hog or the large steer. Meat cuts of light weight are wanted. Fattening is an expensive process. Recent high prices for corn have made it costly to produce the heavier hog. Why take hogs to 200 pounds or over when lighter weights are preferred? It is important to keep posted on the market and to know what we are going to get for our stock.

I have some purebred beef cattle and have sold some excellent calves for Club work. If there is assurance of an outlet, I will gladly raise a number of good calves for feeders. I dislike to see good young beef heifers going for veal.

Though I am far from a pessimist, I look for lower

prices on meat animals in the future. I am glad that the Maryland Stockmen's Association is developing so well.

Mr. Stanley P. Stabler, for the Auditing Committee, reported that the treasurer's report as examined by them was accurate and recommended that it be accepted. The Auditing Committee's report was adopted.

Mr. W. H. Cunningham, for the nominating committee, recommended the reelection of the officers of the past year and the addition of Mr. Harry Cohen, Easton, to the Executive Committee. This report was unanimously adopted, and officers as follows were elected for the Maryland Stockmen's Association for 1930:

President—W. R. Harvey, Corbett, Baltimore County

Vice-President—H. D. Wolfe, Glenwood, Howard County.

Secretary-Treasurer—B. E. Carmichael, College Park, Prince Georges County.

Assistant Sec'y-Treas.—K. A. Clark, College Park, Prince Georges County.

Executive Committee—J. S. Jones, Olney, Montgomery County; E. L. Thomas, Frederick, Frederick County; D. B. McDowell, (P. O.) Nottingham, Pa., (Residence) Cecil County; G. B. Fenwick, Glyndon, Baltimore County; H. N. Cohen, Easton, Talbot County.

Director of Maryland Farm Bureau Federation, Mr. Edgar L. Thomas, Frederick, Frederick County.

Delegate to Maryland Farm Bureau Annual Meeting, Mr. G. B. Fenwick, Glyndon, Baltimore County.

(Adjournment.)

REPORT

of the

FIRST ANNUAL MEETING

of the

Maryland State Poultry Association

January 9, 1930

BALTIMORE, MARYLAND

The first annual meeting of the Maryland State Poultry Association in conjunction with the Maryland Agricultural Society-Maryland Farm Bureau Federation, was held at the Lord Baltimore Hotel, Baltimore, Maryland, on Thursday, January 9, 1930 at 9.00 a. m. Mr. S. M. Horst, of Maugansville, President of the Association, presided.

Mr. Horst called on the first speaker, Professor Roy H. Waite, who delivered the following address:

LESSONS LEARNED FROM THE MARYLAND EGG LAYING CONTEST

BY ROY H. WAITE, Professor of Poultry Husbandry, University of Maryland

I am afraid my talk this morning will be somewhat disjointed. Because of the nature of the subject it must of necessity be somewhat disjointed and take more or less the form of a report. I have jotted down and listed a number of points that readily come to mind. In the first place, in going over the records of our Egg Laying Contest, we have been impressed with the rather small amount of extra feed required by good producers over the amount consumed by pens with inferior records. The extra eggs produced by these good pens are very largely

clear gain and demonstrate the advantage of using high producing strains in commercial egg production.

We have also found it interesting to note the relatively small amount of grit and bone consumed when compared with total feed eaten. The cost of these two items does not amount to more than about three cents per bird per year. In our fourth contest grit and bone consumption ran exceedingly low, averaging only 2.85 lbs. per pen for the former and 2.46 lbs. for the latter. A possible explanation is that the use of cod-liver-meal, added to the ration in this contest, and which is associated with mineral metabolism, may have caused the lessened consumption.

It has been gratifying to see the steady gain in the average production of Maryland pens. From an average of 170.5 eggs in the first contest, to 193.7 in the fourth, in a gradual rise, has been quite a jump and we will hope the Maryland pens will continue to improve until they top the list.

There has also been a steady gain in the general contest average, production having stepped up each year from an average of 175.8 eggs in the 1925-26 contest to 200.6 eggs in the contest that closed in October 1929. Part of this gain can, no doubt, be attributed to better care on the part of the management, due to experience in handling contest flocks, but a major part of the credit must go to the breeders who are sending in better birds.

We have rather thoroughly demonstrated the possibility of getting good egg production in open front houses. Our contest houses are of the extreme open front construction and being but ten feet deep and each housing but twelve birds, the house is given a rather severe test. In the larger house, such as we recommend for commercial use, the depth is twenty feet and the birds range further away from the opening and have a decided advantage especially at roosting time. The secret of getting results with an open front system, if it may be called a secret, is to make all side walls, roof, and rear end as near airtight as possible to prevent drafts from blowing through and carrying the body heat away from the birds. In our contest

houses we "religiously" go over each house, once a year, in the fall, and chink up with tarred oakum any cracks or crevices that may be found.

In our contest houses the water receptacles are on the same platform with the mash and we have been impressed with the fact that this seems to encourage mash consumption. It enables the birds to mix their own wet mash by taking a few swallows of dry mash and then a sip or two of water to wash it down and make it wet.

We have found it possible to dispense with the morning feeding of grain so that but a single daily feeding of grain is necessary. In the first two contests and in part of the third, grain was fed twice daily, morning and evening. During the third year, due to difficulty in obtaining efficient help, it became necessary for the "professor" to take over the duties of the feeder. In the winter months, to save time, sufficient feed for both evening and morning feeding was thrown out, the hens ate what they required for the evening feed, and left the balance for morning. It was the intention to revert to two feedings when the days became longer but when the time came we were very busy and put off making the change from day to day. Finally it became apparent that the birds were doing as well, if not better, on the single feeding. The change back to two feedings has never been made and production continues to increase.

To improve our feeding technique and to insure uniformity in the feeding operations we have designed a feeding device by which all of the hundred pens are fed simultaneously by the throw of an electric switch. Dump pans have been hinged to the ceiling of each house and the grain is placed in these pans by attendants at any convenient time throughout the day. To insure the correct amount of feed being given, a system of factor cards and indicator cards has been designed whereby one-half the daily consumption of total feed, by each pen, during the previous week is indicated to the attendant. He is thus enabled to measure out the approximately correct amount of feed for the pen for that particular day. The

system works nicely, rank beginners learn to feed quickly, and many commercial poultry raisers can no doubt improve their feeding efficiency by adopting the system.

We have found that our double yarding system, whereby each yard is allowed to rest for a whole year and our system of removing the night droppings and floor droppings from the plant has, up to the present time at least, kept us from having any serious trouble with internal parasites. Of course we realize our system is not perfect in that with so many pens in a limited space there is considerable wash from the used to the yards being rested but we do all that we can to prevent such wash and results so far have been very satisfactory.

We have had very little trouble with chicken pox and there has been practically no spread of pox from infected pens to well ones. Each year a few pens come in bearing pox but it does not spread. We ascribe our freedom from this disease to the fact that we use open front houses, allow the birds to range in yards, even in the severest part of winter, and do all that we can to keep the birds in good flesh, especially the pens that are laying heavily.

We get very few complaints from our customers, of blood spots and none of watery whites. We think possibly this is due to our conservative system of feeding and the liberal use of fresh green stuff. We think possibly yarding plays a part in eliminating these troubles.

In our study of the physical character and make up of the high producing individuals we become more and more impressed with the fact that trapnesting or its equivalent is the only satisfactory method for picking the outstanding birds from a production standpoint. It seems quite possible to pick the top half of a flock of birds and group them together but to pick the high individuals is practically out of the question with our present knowledge.

We have learned that good producing stock and efficient marketing are the important factors in producing a profit in commercial egg production at the present

time. We have found that egg consumption can be greatly stimulated by putting out a high grade article. A large proportion of our contest eggs are sold at retail on the same day they are laid and it has been interesting to study the reaction of the public to such quality from a freshness standpoint. Customers will drive miles to get such eggs and pay top retail prices for them.

We have found it possible to somewhat flatten out our peak spring production so that more of the yearly total of eggs are produced during the summer and fall months when eggs are more in demand. Whenever production hits seventy percent we load the hens with all the fresh green feed they will consume. This reduces mash consumption, checks production somewhat, but at the same time keeps the hens in health for future production in the slack season.

We have found that feed cost averages about 13 cents for Leghorns and about 16 cents for the American breeds.

(Copy of chart used by Prof. Waite in his address)

Averages from the Maryland Contest Records on a Per Pen Basis

Feed Consumption	1925-6	1926-7	1927-8	1928-9
Mash	451.6 lbs.	475.9 lbs.	461.3 lbs.	492.1 lbs.
Grain	454.1 "	434.3 "	461.2 "	468.9 "
Oyster Shell	34.7 "	32.7 "	35.3 "	35.6 "
Grit	19.7 "	6.97 "	7.0 "	2.85 "
Bone	8.6 "	5.0 "	4.16 "	2.46 "
Av. Production				
Entire Contest	175.8 eggs	186.4 eggs	191.3 eggs	200.6 eggs
Md. Pens	170.5 "	182.9 "	189.7 "	193.7 "
High Pen	231.2 "	251.4 "	252.9 "	252.9 "
Md. High Pen	231.2 "	220.2 "	252.3 "	246.9 "

Following this address Mr. Horst stated that Mr. Raper was unable to give his talk, but that Mr. Rice would deliver remarks on the benefits of certification prepared by Mr. Raper.

BENEFITS OF CERTIFICATION OF FLOCKS IN MARYLAND

BY PAUL A. RAPER, Inspector in Charge,
University of Maryland, College Park

I do not believe that the benefits of certification of poultry can be explained without first summarizing the certification work for 1928 and 1929.

The accompaning table shows the total number of birds examined in 1928 and in 1929, total number of certified birds, the per cent of birds examined that were certified, number of birds given the blood test for Pullorum Disease (Bacillary White Diarrhea), number of counties having one or more certified flocks and the number of flocks certified.

	1928	1929
No. examined	17,000	22,083
No. certified	12,100	16,365
Per cent certified	71	74.1
Blood tested	951	3,304
No. counties	9	10
No. flocks	53	82

The number of birds submitted for certification has increased each year since 1925 when certification of poultry was first started. Although the increase in number of certified birds this year was not as large as in previous years, there was a decided improvement in the quality as shown by the fact that 3.1 per cent more of the birds examined were certified in 1929 over 1928.

Before considering the benefits of certification, I wish to explain in a brief way the qualifications for certification. (1) All applicants must be members of the Association and approved by the Directors as to their poultry experience and ability, character, responsibilty and business integrity. (2) The flock must show general excellence of stock in constitutional vigor and both standard and production breeding, which is interpreted to mean that breeding birds shall evidence a high degree of inherent stamina, be distinctly representative of the breed and variety in size, type and color, and in addition show productive capacity. Particular superiority is left for

each breeder to prove for himself, exhibition in the show room, or egg production in the trap nest or laying contest. (3) Plant sanitation and management must be conducive to health and freedom from disease. The health of the stock upon inspection is the ultimate basis of judgment as to adequate sanitary practices and effective husbandry, and must meet the inspector's approval.

The benefits of certification may be classified as serving a two-fold purpose; *economic* and *educational.* First let us consider the economic benefits derived from certification. (1) You get higher egg production from fewer hens, due to the fact that the birds remaining in the flock are not crowded and have greater access to the mash hopper, hence they eat more food which increases the number of eggs each hen lays. (2) Lower cost of producing eggs. No boarders or slackers to feed. (3) You develop a healthy, high producing flock within a few years. The outstanding strains of poultry we have today have been produced by culling rigidly. Some have been bred for exhibition while others have been bred for the production of eggs. Then there are others that have combined both standard and production qualities. (4) You reduce the loss from disease. Birds showing low vitality are culled, consequently are disposed of at a profit rather than complete loss of the bird. (5) Eliminates low producers from the breeding pen. Always use your high producers for breeders, provided they conform in a reasonable degree to the standard as it is their progeny that will lay the largest number of eggs. The low producers should never be allowed in the breeding pen. (6) Decreases the loss from overfat hens in hot weather. The tendency is for the poor producer to become overly fat and die from excessive heat in hot weather. (7) Certified chicks live and grow better. The Maryland "Grow Healthy Chicks" records for 1929 show that on 12 farms carrying out the following practices (1) clean chicks, (2) clean house, (3) clean ground, (4) clean litter, (5) clean feed, (6) clean management, (7) separate sexes, (8) keep records, starting with 12,075 chicks, 1,146 chicks or 9.49 per cent were

lost until pullets were housed. On 26 farms following all practices except "clean chicks," which mean certified or blood tested, or both, starting with 30,472 chicks, 6,020 or 19.75 per cent were lost until pullets were housed. The loss was 10.26 per cent greater on the farms not using clean chicks, which is very concise proof that certified chicks live and grow better. (8) The profits are larger. There is no doubt in my mind that this is true for the reasons already mentioned.

The educational benefit of certification should never be overlooked when considering the value of certification. (1) The birds showing superior breeding qualities are pointed out to flock owners. (2) Birds showing standard qualities as well as production are called to the attention of the breeder, consequently he has a clearer picture of the standard bird. (3) Flock owners are paying more attention to standard than formerly because of the reason previously mentioned. (4) The purchasers of baby chicks are demanding better quality chicks.

I do not believe that any poultryman can afford to overlook any of these facts.

The dairymen advocate butchering the scrub bull. We should go a step further and butcher both the scrub rooster and cull hen.

THE MARYLAND FARM EGG RECORD PROJECT

By W. H. Rice, Extension Poultry Husbandman,
University of Maryland,
College Park, Md.

Can you answer all of these questions?

How many eggs per hen did you get last year? What was the average selling price per dozen? Did your birds average as many eggs for the year as your neighbors'? Were they above or below the average of the State? Did your pullets begin laying early last fall when eggs were high priced? If not, why? Did your hens stop laying too early in the summer? When did they begin laying again?

Are you satisfied with them? Are you using the best methods of poultry husbandry?

You may answer a few of these questions without keeping any records at all, some of them you may answer by referring to your own records, but to answer them all you must see the records of others and compare them with yours. Would you like to be able to answer them all satisfactorily and accurately? If you will do your part, the Extension Service can do much towards making satisfactory answers to such questions a reality as refers to your flock. This can be done through the Maryland Farm Egg Record Project which was inaugurated November 1, 1929, by the University of Maryland Extension Service.

(Records referred to by Mr. Raper)
Summary "Grow Healthy Chicks" Records
Maryland—1929

(Records referred to by Mr. Raper)

Summary "Grow Healthy Chicks" Records
Maryland—1929

	No. Farms	No. Chicks to Start	No. Chicks Lost Until Pullets Were Housed	No. Cockerels and Pullets Sold and Culled	No. Pullets Housed
Followed all practices	12	12,075	1,146	5,646	5,283
Percentage	100	100	9.49	46.75	43.75
Followed all except No. 1 (clean chicks)	26	30,472	6,020	12,786	11,666
Percentage	100	100	19.75	41.96	38.28
Followed all except No. 3 (clean ground)	4	3,370	547	1,533	1,290
Percentage	100	100	16.23	45.48	38.27
Did not follow No. 1—clean chicks No. 3—clean ground	20	19,660	4,394	7,839	7,427
Percentage	100	100	22.34	39.87	37.77
Did not follow three or more practices	10	7,765	2,130	3,018	2,617
Percentage	100	100	27.73	38.86	33.70
Totals	72	73,342	14,237	30,822	28,283
Unclassified	13	9,179	2,210	3,953	3,016
Totals	85	82,521	16,447	34,775	31,299
Average Percentage			19.81	41.75	37.57
Records Incomplete	42	33,126	1,979		259
Grand Total	127	115,647	18,426	34,775	31,558

Mr. Rice then proceeded with his own talk.

LIBRARY, UNIVERSITY OF MARYLAND

The Maryland Farm Egg Record Project is to be composed of cooperator members bent upon improving their poultry practices and increasing their poultry profits. This is designed to be accomplished in several ways, but principally as follows: Accurate but simple records such as will answer the fore-going questions and timely information which, together with the record forms, will be furnished free to cooperators. Monthly reports and summaries of the figures from cooperators reporting, to which will also be attached additional timely information on significant developments in and analysis of the records as well as timely subject matter information, will be furnished each cooperator. Where interest warrants, regular group meetings of the cooperators will be held to discuss records and poultry problems.

On each page of the calendar is a form for keeping the daily egg and flock record, a seasonal illustration and as much timely information on poultry management as space permits. For your convenience the back of each monthly page has been ruled for keeping a record of expenses and receipts. Each monthly page shows Production Standards which are based upon records made at the Maryland State Egg Laying Contest for the past three years. You should aim to equal these figures.

Complete and reliable records are the yardstick with which to measure your profits or losses.

What you must do to be a member in this project:

1. Apply to your county agricultural agent or to the Extension Service, College Park, Maryland, for a poultry calendar. The calendar is free, but will go only to those agreeing to make full and proper use of it.

2. Fill out and mail the enrollment card on the first page.

3. Keep an accurate account of the eggs gathered each day and at the end of the month fill out and mail the card at the bottom of each monthly page, giving the number of eggs gathered and the number of birds on hand the first of that month.

4. If possible, keep the records of the hens and pullets separate. If this cannot be done, the entire flock may be allowed to run together and be called a Mixed Flock.

5. Send the record of your entire flock, not just one or two selected pens. It is not the eggs of one or two selected pens, but those from the whole flock that tell the story of your poultry business and interest others.

6. The keeping of the records will not interfere with any of your practices of poultry management. You may decrease or increase the number of birds by culling, selling or buying, provided you make a note of this in your reports.

What the Extension Service will do:

1. Send to each cooperator a summary of the reports each month, which will show the lowest, highest and average records for the month.

2. Prepare for you each month a letter containing helpful suggestions on poultry management.

3. Send a poultry specialist to visit your farm as often as practicable to look over your poultry plant and offer suggestions on management and improvements.

4. Have a poultry specialist meet as often as practicable with you and a group of cooperators to discuss your records and poultry problems, provided sufficient interest in this work is manifested in your community.

The Farm Egg Record Project while new to Maryland is not entirely a new proposition. Work along similar lines has been in progress in Delaware, Pennsylvania, New Jersey, Connecticut and other states for a number of years. It is rather past the experiment stage and is a real service proposition in most states where it is in progress.

To date about one hundred farms have started using these calendars and it is hoped that at least one hundred and fifty will be using them before the end of the year.

Inasmuch as the expense involved in editing and printing these calendars made it necessary to limit the number printed to two hundred and fifty, those of you who wish

to enroll in this work are urged to apply for a calendar at once before the supply is exhausted. Any county agent or the University of Maryland Extension Service can supply you.

Mrs. William G. Sattler of Monkton, Maryland, was then called upon to tell the poultrymen how she raised 600 turkeys in 1929.

HOW I RAISED 600 TURKEYS IN 1929

BY MRS. WM. G. SATTLER, Monkton, Md.

I was successful in raising 600 or more turkeys this year. I was successful financially, but the turkeys have put me in a hole when I have to do stunts like this. Well, here goes:

I kept thirty (30) hens and five (5) gobblers. I put them in three pens, ten hens and a gobbler in each. The two extra birds were kept in reserve. In case of trouble with my selected gobblers, I had a good substitute at hand and would not have to scour the country and then get nothing but a puny bird. Each flock had a home. It was nothing fancy, just any ramshackle building that happened to be at hand, provided it had a roof, three sides and plenty of air. My homes were discarded chicken houses. Connected to each was a five foot poultry wire pen which enclosed one half to two acres of ground. Any convenient amount of ground would have done, just so there was enough green that the birds could not pick it clean.

As you can picture, I was not proud of the appearance of my equipment. However, I was in the turkey business to make money and I always kept before me two main ideas; one—elimination of expense; two—elimination of labor. I never spent a cent unless it was necessary, and I never took a step unless it was necessary. In the little boy's language, I was stingy and lazy.

About the middle of January, I began to make preparation for the laying season. I gave them a preventive

treatment for worms and lice. I dosed each turkey for round worms and tape worms. There were many treatments on the market. I, believing in the easiest, selected accordingly. I treated them when the weather was cold, so that any worms that might be present would freeze. For lice I gave the pinch method treatment of sodium flouride. To prevent them from flying over the fence I tied boards on their backs. The gobblers did not need them; they were content to stay with their wives. It was only the hens that, as usual, were unruly. I also added laying mash to their menu. I gave them Maryland Turkey Laying Mash, which is high in proteins. The shell, grit, charcoal, scratch, water and milk—whenever I had it—was still kept before them. I then put in the pens barrels or large boxes, and made nests in them with leaves or straw and nest eggs. Sometimes the birds liked these nests, again they preferred their own. Some picked out a discarded hot bed, another a hole under the turkey house. Whenever I saw a hen looking at a place for a nest I generally helped her along by making it more attractive and secluded with branches.

Now my birds were ready until the eggs appeared. They came around the first of March. The gathering was very different from trotting all over the farm. I just put a basket on my arm, went into the three pens and in a few minutes came back with two dozen or more eggs. Straight into the incubator room I took them and put them into the three peach baskets, No. I, II, III, which I had ready to receive them. I dated and marked each egg with an X on the top and an O on the bottom. I left them in rest and peace and did not daily turn them as is customary. Again I was lazy, but I found it useless work which did no good, sometimes harm by breaking the eggs. On the big calender on the wall I marked the number daily collected. Whenever the eggs were a week old they went into the incubator regardless of number.

I had many makes of incubators, all oil burning, hot air machines, but found one about as good as another. These machines stood in a cellar, which had a big door

always kept open, and two large windows with sash removed. I am sure anyone would have been shocked with the amount of air that swept through that room. To break the draft I tacked sheets to the windows and reinforced them with lattice.

In this room I hatched my eggs, almost like chicken eggs only less temperature and more ventilation. The starting heat was a low 102 degrees with the bulb of the thermometer on a level with the top of the eggs. To get my bulb at the proper height I had to tie the thermometer on little sticks of wood. It was a most important point. Might say, many have come to grief because they were not careful enough about this level. Now I tried to hold this temperature throughout the hatch, but always found towards the last week whenever I went to the machine, it registered about 103°. I did not object to 102-103 but I did not want it to go above this mark. The ventilation was greater than for chickens. Started machine with ventilators one-quarter open, second week one-half, third week three-fourths and fourth week wide open. I turned the eggs night and morning but did not cool them. I watched the air space very carefully and my ventilation was governed by it. My eggs were candled weekly and all dead germs removed. Most of the hatches came off on the 27th day. The poults stayed in the machine until the evening of the second day after the main hatch. For example if most eggs hatched on Sunday the little turkeys were taken out Tuesday evening. This method gave wonderful hatches. Out of an original 130 eggs I got 121 poults, six eggs were candled out and three were unhatched. Hens couldn't have done better.

My little poults were hardened off by lowering the temperature, were toe punched, put in bushel baskets, covered up and taken to the brooder house. The brooder house was on skids, the Maryland State Brooder House type. I had three of them and was very proud of them—only good looking part of my equipment. Each house had a coal burning brooder of 500 chick capacity. When the brooder was regulated to a temperature of at least 100°

I put the poults under the hover and treated them as you would chickens only giving them more ventilation.

The next morning I had to spend sometime in the brooder. Shell grit and equal parts milk and water were put before the little turkeys. I introduced every little poult to the milky water by poking his head into the fountain and making him drink. Then I gave him his first meal, the Maryland Turkey Growing Mash. I moistened with water and one tablespoon of cod liver oil, a small portion of the mash, enough for 100 poults to consume in one meal. For the first two days I alternated with milk and mash and fed every two hours. When the poults became as fond of the mash as the milk I let the latter stay before them all the time. At six weeks of age I gave them whole wheat, corn and oat groats. The mash had added to it bone meal, sifted sulphur and cod liver oil. I gradually increased each:—bone meal 5% at four months of age, sulphur 5% at four weeks, and cod liver oil 2% at two weeks of age. I also gave them semi-solid buttermilk when the poults became so numerous that our milk supply wouldn't stretch. That was all there was to the feeding. Someone from West River asked me if I baked custards and made curds for my 600 turkeys like she did for her twenty. I am glad to say my feeding was much simpler.

At the age of a week my little poults got their first walk into the wide world. I enclosed a small portion of ground with one-half inch poultry mesh, thirty inches high and fastened to the ground with little wooden pegs. I saw that every turkey left the brooder and in an hour's time saw that every turkey got back into the brooder. After a day's outing they seemed to know how to find their way around. Gradually I enlarged the pen until they were big enough to fly over, when I had to put up the five foot poultry wire. I took a crow bar, wiggled it in the ground, and into the hole put a pointed sapling. To the saplings I tied the wire with binder twine. This crude fence had two advantages, easy to put up, easy to

take down. In the end my entire flock of six hundred turkeys were combined into two large pens.

When the turkeys were ten days old they were given small roosts in the brooder house. When they were six weeks old they were given out of door roosts in the turkey pen. Then they could do as they pleased, either spend the night in the brooder house or outside in the fresh air. These roosts had a roof and protection on one side. They were old discarded turkey coops that I put on stilts and brought into use. When they became crowded it was time to move the birds to the big out of door roosts. These were made of trees cut from the woods with a straw thatch effect roof. This first big roost cost me, barring time, twenty-five cents, the price of the nails. However, my feelings were not hurt when someone said it looked like twenty-five cents for it served its purpose and was not unartistic at that. I had two of these large roosts.

For protection I had electricity brought out to one roost, and a receptacle box installed. To cut down expense my small boy and I did the rest of the wiring with 5 and 10 cent store material.

This method, faulty as it may have been, produced the turkeys and brought in financial returns. It was due to the help and suggestions of Mr. Rice of the Extension Service and of Mr. Derrick, our County Agent that I had this success with my turkeys.

At this point Mr. Horst gave his address as president of the Association.

OBJECTIVES OF THE MARYLAND STATE POULTRY ASSOCIATION

BY S. M. HORST, President,
Maryland State Poultry Association
Maugansville, Maryland

The Maryland State Poultry Association has been very instrumental in building the quality of our poultry up to the present standard.

I believe we have been neglecting a very important phase of the poultry question, namely the grading and marketing of eggs. The poultrymen of Maryland located within reach of the best markets of the United States are receiving considerably less for their eggs than the California poultryman, having his feed shipped from the middle west, reship his eggs to the New York market and receiving a substantial increase over nearby producers. Why? Because they are organized, aim for quality and hold it utmost in grading.

We speak of New Jersey as being a great poultry state, but are you aware that there is more poultry in the State of Maryland than New Jersey? It is a shame on the part of the poultrymen of the State that we let eggs be handled as they are in our city markets; handled as though they are but some by-product instead of being the only bottled sunshine put up in a sealed package not touched by human hands.

One of the next moves which should be considered is to educate the buying public to the value of poultry products in the diet.

Mr. Fell, Secretary of the Association, after having been introduced to the audience, gave the concluding talk on the program.

HOW THE PROPOSED TARIFFS WILL AFFECT THE POULTRY INDUSTRY

BY AARON FELL, Secretary-Treasurer,
Maryland State Poultry Association
Bethesda, Maryland

The present session of Congress is considering, among other tariffs, one in particular which is of vital interest to poultrymen.

Supporters of tariff on cod-liver oil have proposed a tariff of sixteen cents per gallon. This is the principal item which concerns the poultry industry as poultrymen of the United States use the bulk of the cod-liver oil used in this country.

The present volume of cod fish caught and the volume of oil produced in this country supplies only a small part of the demand for cod-liver oil. It is apparent that the cod fishing industry of the United States will never be able to catch enough fish to produce the oil used by the poultrymen of the United States. The poultry industry of the United States must of necessity depend upon the fisheries of Norway and Sweden to furnish the bulk of the oil used by it.

Naturally the chief agitators for a tariff on cod liver oil are those engaged in the industry limited to the Northeastern or New England States. If this tariff is voted by Congress it means that all of you who use cod liver oil can expect to pay more for it in the future than you are now paying.

I have interviewed several members of Congress on the matter, but more support is needed to prevent a tariff on cod liver oil.

The tariff on eggs seems to be fairly well taken care of as the present importation of Chinese eggs is less than it formerly was.

The importation of turkeys from Argentina and to some extent from other countries is now becoming a serious matter to our turkey growers. The present tariff of six cents per pound has been proposed to be raised to fourteen cents on all turkeys imported.

All of you can help the industry, of which you are a part, by writing your Senators and Congressmen requesting them to oppose any tariff to be placed on cod-liver oil and that the present tariff on turkeys be increased to fourteen cents per pound. This should be done at once as these matters are now in committee hearings in Congress and will come up for action probably in April.

If you will do this at once you will probably be well repaid if we are successful in preventing a tariff on cod-liver oil. It is perhaps doubtful if a tariff will be placed on cod-liver oil, but we cannot afford to neglect our chances of preventing it by doing nothing.

Write to each of your Senators and Congressmen when you return home, asking them to oppose any tariff on cod-liver oil and to vote for an increased tariff on turkeys.

Mrs. Helen Baker of Chestertown, being present arose and discussed views on the matter of cod-liver oil tariffs, and also recent developments in turkey production. Several questions were asked and discussed in an able manner by Mrs. Baker, Mrs. Sattler and others.

Meeting adjourned at 12.45 p. m.

REPORT

of the

ANNUAL MEETING

of the

Maryland Tobacco Growers Association

January 9, 1930

BALTIMORE, MARYLAND

The Annual Meeting was held January 9, 1930, as one of the affiliated organizations with the Maryland Agricultural Society, Maryland Farm Bureau Federation. It was the largest meeting ever attended in the history of the Maryland Tobacco Growers' Association.

In the absence of Hon. Thomas Parran, who was unavoidably delayed, the meeting was presided over by Mr. George I. Gardiner, Executive Vice-President and Consulting Manager of the Maryland Tobacco Growers' Association. In a few words Mr. Gardiner explained that the report that would be rendered by the president, the secretary, and the manager, would be a most favorable report and it would show, if the monthly and quarterly report were checked off as the year went on, that the goal set by the Board of Directors of 1929 had been successfully met, and that the plans for 1930, while the details had not been worked out, had been along the conservative lines that had built the organization to its present membership and strength, and of which they were proud.

Mr. Arthur Jones, Secretary, was then introduced and in a few well chosen words delivered his report, which was highly favorable to all present.

The outstanding address of the meeting was made by Hon. Joseph A. Wilmer, the newly appointed commissioner of the 1930 census, who was a former director of the Maryland Tobacco Growers' Association, and with well equipped knowledge of the internal and external affairs of the Association, delivered one of the best addresses on the advantage, the development, and the progress of the Association.

Mr. Gardiner then gave a most encouraging picture of the future outlook for Maryland tobacco, bringing together the supply and demand in very comprehensive figures to show that if the Association received a larger percentage of the tobacco in 1930, that all conditions indicated that the 1930 crop should bring a price according to supply and demand well above the cost of production. He followed this up with the outstanding accomplishments of previous years and the present status of the Association, which was not covered by other reports.

Mr. J. C. Brown, manager of the Maryland Tobacco Growers' Association since 1928, then delivered his report in detail, covering his management, which received much applause from all present and was very gratifying to the Board of Directors, who have consistently cooperated in all of his undertakings.

In its entirety, much enthusiasm was evidenced by all present and gave great evidence of their continued support in the most valuable franchise ever known to the Maryland farmer, and that is the existence of the Maryland Tobacco Growers' Association.

REPORT

of the

HOME AND COMMUNITY COMMITTEE MEETING

Maryland Farm Bureau Federation

January 9, 1930

The seventh annual meeting of the Home and Community Committee was called to order at 10:00 A. M. on Thursday, January 9th, 1930, by Mrs. Harry T. Williams, Chairman of the Committee.

Mrs. M. Melvin Stewart, Secretary of the Committee, read the minutes of the last meeting. The minutes were approved as read.

Mrs. Harry Davis, of Frederick County, gave a talk on "Landscaping the Farm Yards." Mrs. Davis is Chairman of the Home and Community Committee of her county, and also chairman of the Rural Club Women of Frederick County.

Part of her talk was as follows:

"The farm woman must make the first start in beautifying the farm home grounds, and I want to talk as one farm woman talking to another. 'Tis well said, 'The glory of a garden glorifies all.' And what garden needs to have more glory than the one on the farm home? A garden is the place where the oft-times weary home-maker may find a reprieve from her too monotonous household duties, where we can find ourselves. The motto for the bird sanctuary created by Edward Bok in Florida is, 'We come here to find ourselves. We can so easily get lost in the world.' So it is with the home-maker, with her pots and pans, and so many other things demanding her attention, but if she is trying to beautify her home grounds, she may do it herself. She can't sit for hours with palette and brush to paint a picture on canvas; but she can, by devoting a few moments each

day, make a picture of trees, shrubs and flowers that an artist will want to paint. We really haven't lived unless we have tried beautifying our home grounds.

"Grounds surrounding the farm home have been improved the past few years, but there is much to be done yet. If we feel that we can't do our own landscaping, the Extension Service will help us by sending a specialist in ornamental gardening, who will lay out our grounds and stake them off, and we can plant when it suits us; but every woman should help with this layout, as we should want an individual garden.

"We may feel that the expense is too much, and we don't have the time. For the first we can have very beautiful grounds by having them well kept and using the cheaper and our native shrubs. As for the latter, don't we always have time to do the things we want to do, and why not want to beautify the farm home grounds?

"Sumac makes a lovely screen. If planted thickly, it is a mass of green in summer and the coloring in the fall is wonderful. All of us want a perennial border with all of the old-fashioned flowers, for if kept free of weeds it will grow in beauty year after year.

"The entrance from the highway to our farm home should be given attention.

"Out from the kitchen window, where the farm woman looks the oftenest, should be a plot of green with flowers planted all around. We all know that there are days when the busy farm home-maker can't get out in the garden, but when she looks out of the window the flowers seem to say, 'Stand by—this, too, will pass.'

"The service buildings on every farm should be given attention. The grounds around those should be planted with shrubs to screen them—and if not shrubs, hollyhocks and golden glow.

"If you are contemplating improving your grounds, begin this season, as it takes a long time for them to become glorious.

"In closing I wish to repeat the Inscription to Entrance to the Bird Sanctuary:

'The kiss of the Sun for pardon,
The songs of the birds for mirth,
You are nearer God's heart in a garden,
Than any other place on earth.'"

Greetings were extended to the Committee by Miss V. M. Keller, State Home Demonstration Agent, College Park. One of the things that the Home Demonstration Agents want to accomplish this coming year is to help the farm woman in planting her garden. Miss Keller said she had had the pleasure of seeing Mrs. Davis' garden, and it was beautiful. She said that Mrs. Davis had completely converted her husband to the importance of that garden, though he had not been enthusiastic at first. Miss Keller expressed her pleasure at being able to attend the meeting of the Farm Bureau women and was glad to see such a fine attendance.

Next on the program was an address by Mrs. Evelyn Harris, formerly Home and Community Chairman for Kent County—a newspaper writer, lecturer and successful orchardist.

Mrs. Harris gave a talk on "Handicaps," which was full of helpful suggestions as well as being very witty.

"The definition of handicap is 'certain conditions imposed on contestants in order to bring about equality.'

"The first handicap is Sex. A woman's name on a note or legal paper is not as important as that of a man's.

"Lack of roads was another of the handicaps brought out by Mrs. Harris.

"Another handicap of the farmer is the foreign pests that get into the fruits and vegetables and destroy them.

"The greatest handicap to the farmer is the low duty on imported fruits and vegetables. Last year 140,000 cars of bananas came in duty free. Therefore they were sold for much less than fruit grown here in America. People buy bananas instead of apples and pears that are grown here.

"Still another handicap is the lack of paint. Companies here in the city paint their buildings every year, but the farmer can't afford to paint his buildings that often and they decay and fall to ruin. If he did paint up, his taxes would be greatly increased."

Mrs. Isaac H. Dixon, who has farms in both Kent and Talbot Counties and has done so many things to help Farm Bureau men and women, had been asked to bring some message from the National Farm Bureau Convention. In a happy little speech Mrs. Dixon addressed the group, but said she was leaving the report of the National Meeting to be given by Mrs. Willson, Chairman of Talbot County, who accompanied her to Chicago. Mrs. Willson's report follows:

Broadcastings from the National Farm Bureau Federation

"It is my pleasure to submit to you the happenings of the American Farm Bureau Federation at Chicago in December, 1929.

"The National Meeting opened with old Southern melodies and patriotic airs, after which Mr. Sam H. Thompson took his seat. He then appointed a Board, who were to act as Chairmen of Sessions. After calling the meeting to order, the members arose to sing 'The Star-Spangled Banner,' led by Mr. Oscar A. Kirkkam, who was chosen as musical director. The entire delegation stood silent with bowed heads for our departed leader, Mr. Bradfute.

"Mr. Winder, the Executive Secretary, then gave his report, after which the Vice-President, Edward A. O'Neal, told of his work in conjunction with the President.

"Mr. Thompson next gave his address, telling about the outlook of Farm Bureau Work. He emphasized the value of teamwork as a source of satisfaction and that it has resulted in strengthening the hands of the executive officers in administering the affairs of the organization. He said, 'For eleven years the American Farm

Bureau Federation has been engaged in pioneer work. We have removed the boulders of misunderstanding and cleared our own minds of doubts and fears. I now believe that the way is clear for the American Farm Bureau to go triumphantly forward in the accomplishment of its real mission—the building of a permanent, successful American Agriculture.' Mr. Thompson was much impressed with an inscription that is carved in marble over the entrance to Union Station in Washington. It reads as follows: 'The Farm—Best Home of the Family; Main Source of National Wealth; Foundation of Civilized Society; the National Providence'."

This was followed by the Roll Call of States and a report of the Credentials Committee by Enos Lee.

Next came an eloquent speech from Mr. Alexander Legge, Chairman of the Federal Farm Board. A condensed form follows:

"Now that you have what you want, what are you going to do with it?" was the question put by Mr. Legge at Tuesday afternoon's meeting. He congratulated his farmer hearers on having at last attained the objective of their long struggle.

"The structure is there and is sound. The Marketing Act is the recognition of the new place in the sun of American Agriculture. The work is started; the foundation is sound; and the rate of progress depends not so much on the Farm Board as on you farmers. If you really get the habit of working together, pulling together to the common end, you will go far."

He said, "When the Farm Board was created, we were told that the Marketing Act has to do with the surplus, and we have found that indeed there is a great surplus—of plans. We have found that there are a thousand ways to deal with agriculture."

"This was followed by a discussion of the various phases of Agricultural Marketing problems from different State leaders—Maryland being represented by our State Secretary, Mr. Stewart.

"The meeting adjourned for a beautifully prepared Tea by the Home and Community Committee, with Mrs. Sewell as Chairman. While the members were enjoying the tea, the Cotton Textile Institute staged a Fashion Show. After the tea Mrs. Sewell presented all the Home and Community Chairmen with a corsage bouquet as a reward for their efforts.

"The banquet was a marvelous affair, attended by about a thousand members. Each group or state had a song from their own locality. The Eastern delegation, headed by the Massachusetts Farm Bureau folks, created a sensation when they appeared, costumed as Pilgrims, and in true old New England style gave a formal invitation for the American Farm Bureau Federation to hold the 1930 convention in Boston.

"A dance followed the pageant. And the menu! It was, as usual, up to the high standard of the Hotel Sherman's famous cuisine. The Story of the Pageant after the banquet described Old Father Time viewing in a crystal the development of agriculture through the ages. This was written and directed by Miss Verna Elsinger, Chairman, Home and Community Work, Ohio.

"There were several instructive talks given by the following: Hon. Clarence Cannon, on 'The Necessity for Farm to Market Roads'; Hon. Paul Bestor, on 'Agricultural Finance'; Hon. A. J. Weaver, on 'Waterways and the Farmer'; Col. E. L. Daley, on the 'Inland Waterway Development Program.'

"Then came a consideration of resolutions. Several more speeches followed. Arthur W. Gilbert spoke on 'Inter-relationship of Agriculture and Industry,' and C. W. Warburton on 'Some Outstanding Accomplishments in Extension Work.'

"The election followed, resulting in Mr. Thompson and Mr. O'Neal being re-elected by the voting delegates to serve again as President and Vice-President.

"I can view the future of the American Farm Bureau very optimistically from the experience of the past. If

the members all adopt the Farm Bureau Slogan we will see better conditions for Agriculture."

"Explorers of the Air" was the title of an address by Miss Martha Manahan, who is connected with the Dairy Council.

The address was made more interesting by slides about the life of Rear-Admiral Byrd.

Miss Manahan's address was based on the life of Byrd.

"When Byrd was a very little boy he was interested in flying kites. Before he was thirteen years of age he had been all the way around the world. He went to the Naval Academy. During his years there he was very good in athletics as well as his studies. He was hurt during one of the games and was relieved of service in the Navy. Then he went in for flying. In 1926 he flew over the North Pole. In 1927 he flew over the Atlantic Ocean to France. Now he is down at the South Pole. He has flown over the Pole and is now exploring the land around there. The only way he has been able to do all of these wonderful feats was by eating the right foods at all times and by living a simple life."

An opportunity was next given to any Chairman or member of any County or Local Farm Bureau to speak of conditions in her own locality. A number responded, telling of local projects, banquets, fairs, programs, etc., in which the women helped.

Mrs. Gaver of Frederick again reported twelve meetings and the picnic. She said her local had made a gain in membership—and that her women were very active.

Due to the fact that the Home and Community Committee meeting was being held at the same time as the Poultry meeting—a resolution was adopted asking that an effort be made that these meetings be held at different times next year.

State Secretary Stewart brought greetings to the group at this time, and explained that last year the 4-H Club Conference conflicted with the Poultry Conference. Since there were only two mornings for many affiliated groups to hold their sessions, there must of necessity be

many conflicts. However, he said he'd see that the Woman's Group and the Poultry Group did not conflict another year.

Mrs. Gallagher, Hostess of the Lord Baltimore Hotel, extended greetings to the women on behalf of the Hotel, and invited any groups of them who wished to inspect the laundries, kitchen, etc.

At this point the annual election of a Chairman was held, resulting in the re-election of Mrs. Harry T. Williams, of Worton, Kent County. She asked that Mrs. Charles Willson, of Talbot County, be named assistant to help her. Mrs. Stewart, Home and Community Chairman of Anne Arundel County, was again named Secretary.

Meeting adjourned at 12:00 Noon.

REPORT

of

4-H Club Conference

January 8, 1930

BALTIMORE, MARYLAND

The meeting was called to order by Mr. E. G. Jenkins, State Boys' Club Agent. Following this three club songs were sung by the group; namely, "The More We Get Together," "I'd Like to be a Friend of Yours" and "Dreaming." It was suggested that an acting chairman and secretary be appointed. This was put in the form of a motion and Mr. Charles Hines of Montgomery County was appointed chairman and Miss Erna Riedel of Anne Arundel County as Secretary. Miss Dorothy Emerson, Girls' Club Agent, acted as discussion leader. It was suggested that the group start the discussion on the following topics:

1. How can we improve our club business meetings?
2. How can we gain greater publicity for 4-H club work
   in the community?
   in the county?
3. How much responsibility should the local leader take for the activities of the club?
4. What are the home demonstration agents' and county agents' responsibilities?
5. How can a county build up a county club spirit?
6. How shall we develop "leadership" among our club members and train them to take responsibility?

7. What shall we do to improve our demonstration team work in Maryland?
8. Can we do more to train our club members who represent the organization before public gatherings?
9. What is your standard for a progressive 4-H club boy and girl?
10. By what standard shall we select club members for out-of-state trips.

The discussion started with the topic: How much responsibility should the local leader take for the activities of the club? Mr. Jenkins expressed his belief that club work belonged to the community and local leaders. Most advance ideas of higher officials does not work if general public does not understand. Club work being new, it is not a traditional thing. A radical change has come over in club work in the past six months, this fact being very apparent at the National 4-H Club Congress at Chicago this year.

Mrs. Sutton of Kent County continued the discussion, expressing her viewpoint on local leaders whom she seemed to think did not take enough responsibility and depended too much on county agents and home demonstration agents. Mrs. Sutton believes that the following facts should be followed by local leaders:

1. Local leaders should discuss club work more thoroughly with club members.
2. Local leaders should try to train club members to become leaders.
3. Local leaders should attend local leader conferences.

Mr. Shoemaker, of Frederick County, then took up the subject of local leader conferences, and he expressed his belief that there was no definite program that could be made to adjust the many difficulties of the different local leaders, but that there were certain fundamental facts

that all local leaders must have, which they could obtain if conferences were attended.

Lack of local leaders in the different counties was an important factor discussed by all, and the following reasons were given:

1. County agents and home demonstration agents did not attempt to look for local leaders.
   (a) Home demonstration agents and county agents did not care to work with local leaders because they could accomplish more and do the work quicker and more efficiently than be burdened with the trouble of training local leaders, which takes a lot of their valuable time, which, because of their other duties, is not available.
2. Local leaders obtained nothing financially for their work.

Following this, Miss Emerson brought up the following topic: By what standard shall we select club members for out-of-state trips? The following standards were decided upon:

1. Club member must have record in club and in county.
2. Club member must have degree of self control.
3. Club member must have responsibilities of home.
4. Club member must have definite purpose in his work.
5. Club worker must have character and be able to adjust himself to different purposes.

Mr. Blackwell, head of Vocational Education in the State, spoke after this and made the encouraging statement that this conference was the best he had attended in the past six years.

A summary of the meeting was given by Mr. Evans, of Harford County:

1. Felt need of local leaders for future development of club work.
2. Local leaders are available if searched for.
3. Club work is yet in its infancy and too much should not be expected.
4. Felt need for local leader conferences.
5. Club work should mean a parent and child working on the same problems as partners in the home.
6. Club members should shoulder more problems of the club.

This concluded the group discussion and it was decided that a committee be appointed to arrange the program for the coming year. Mrs. Norton, of Montgomery County, Mr. Stanley Sutton, of Kent County, Mr. Ady, of Montgomery County, and Miss Erna Reidel, of Anne Arundel County, were appointed for the coming year.

A count showed that there were over one hundred adults and older club members from sixteen counties in attendance.

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